ENVIRONMENTAL ASSESSMENT FOR CONSTRUCTION OF FORCE MAIN AND DISCHARGE TO WATEREE RIVER FOR SHAW AIR FORCE BASE, SOUTH CAROLINA

Shaw Air Force Base
December 2004

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ACRONYMS AND ABBREVIATIONS

20 FW	20th Fighter Wing
ACC	Air Combat Command
ACHP	Advisory Council on Historic Preservation
AFB	Air Force Base
AFI	Air Force Instruction
AGL	above ground level
Air Force	United States Air Force
AQCR	Air Quality Control Region
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EBS	Environmental Baseline Survey
ECR	Electronic Combat Range
EIAP	environmental impact analysis process
EO	Executive Order
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FY	Fiscal Year
gpm	gallons per minute
LOS	Level of Service
µ/l	micrograms per liter
mgd	million gallons per day
MOA	Military Operations Area
MTR	Military Training Route
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOV	Notice of Violation
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRIS	National Register Information Service
NWI	National Wetlands Inventory
O3	ozone
P.L.	Public Law
PAI	Primary Aircraft Inventory
Pb	lead
PM10	particulate matter less than 10 micrometers in diameter
PM2.5	particulate matter less than 2.5 micrometers in diameter
PMAI	Primary Mission Aircraft Inventory
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
ROI	Region of Influence
SCDAH	South Carolina Department of Archives and History
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCHT	South Carolina Heritage Trust
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO2	sulfur dioxide
SR	State Route
TCE	trichloroethylene
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDCESA	United States Department of Commerce, Economics, and Statistics Administration
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WMA	Wildlife Management Area
WWTP	Wastewater Treatment Plan

FINDING OF NO SIGNIFICANT IMPACT/
FINDING OF NO PRACTICABLE ALTERNATIVE

NAME OF THE PROPOSED ACTION

Construction of Pump Station, Force Main and Outfall Diffuser Structure to Wateree River

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Shaw Air Force Base (AFB) proposes to construct a pump station and a force main for the discharge of treated wastewater effluent to the Wateree River. The project would include acquiring a permanent easement for the force main and pump station, installing approximately 24,000 feet of force main, and constructing a 2.6 million gallon per day (mgd) pump station. In addition to the proposed action, which routes the force main along U.S. Highway 76/378, this revised environmental assessment (EA) evaluated an alternative route through Gum Swamp, as well as the no-action alternative.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Proposed Action and Gum Swamp Alternative: This revised EA provides an analysis of the potential environmental consequences associated with the proposed action, the Gum Swamp alternative, and the no-action alternative. Nine resource categories received thorough evaluation to identify potential environmental consequences. As indicated in Chapter 4.0, none of the alternatives would result in significant impacts to any resource area.

Land Use, Recreation and Visual Resources: Construction and operation of the pump station and the force main would not result in any significant impacts to land use, recreation or visual resources either for the proposed action or Gum Swamp alternative.

Biological Resources: It is not expected that the proposed action or the Gum Swamp alternative would have an effect on species listed or proposed for listing in accordance with the Endangered Species Act (ESA) or on critical habitat because the majority of the construction would occur within road rights-of-ways or along other corridors that have been previously disturbed. United States Fish and Wildlife Service (USFWS) has noted that no significant effects on resources protected under the ESA would occur with the implementation of the proposed action. If the Gum Swamp alternative is chosen, a Section 404 permit for construction in wetlands would be required and complied with as a component of the project.

Cultural Resources: Construction activities are not expected to impact cultural resources at the proposed action or Gum Swamp alternative locations. Consultation with the State Historic Preservation Office (SHPO) has been initiated and compliance with the National Historic Preservation Act (NHPA) Section 106 would take place prior to project construction.

Water Resources: Construction and operation of the force main would not be expected to significantly affect the water quality of the Wateree River and would improve or not

significantly deteriorate the water quality of Beech Creek. The amount of treated effluent currently discharged by the base would be approximately 0.25 percent of the average flows in the Wateree River. With the proposed action and the Gum Swamp alternative, treated wastewater would no longer be discharged to Beech Creek. This action may improve water quality in the creek by reducing copper levels and flows in that portion of the creek immediately downstream of the existing outfall. For the proposed action, approximately 1,160 feet of the force main would be within the 100-year floodplain of the Wateree River. Under the Gum Swamp alternative, about 12,000 feet would be constructed within the floodplain. There is no practicable alternative, however, that would not involve construction in the floodplain. No adverse environmental consequences are anticipated from the construction with either alternative.

Earth Resources: Standard construction practices would be applied to control sedimentation and erosion during construction, thereby avoiding secondary effects to any wetlands or freshwater aquatic communities.

Air Quality: This project is sited in an attainment area. Construction-related air emissions would result in minimal change in air quality for either the proposed action or the Gum Swamp alternative. There would be no adverse impacts to air quality; therefore, a formal air quality conformity determination is not required.

Infrastructure: Implementation of either the proposed action or the Gum Swamp alternative would have no adverse effects on the potable water and wastewater infrastructure. Construction activities may temporarily close one lane to vehicles traveling on Claremont and Old Garners Ferry Roads and U.S. Highway 76/378. The construction contractor would provide appropriate traffic control and given the low traffic volumes, no adverse impacts are anticipated.

Noise: Implementation of the proposed action and the Gum Swamp alternative would cause minor, temporary increases in localized noise levels in the vicinity of the project area during construction. Noise would be similar to typical construction noise, and last only the duration of the specific construction activities. The noise disruptions would be temporary and would be limited to daytime hours; therefore, impacts are considered insignificant.

Socioeconomics and Environmental Justice: Construction activity, employment, and earnings associated with the proposed action and the Gum Swamp alternative would be very similar. No adverse socioeconomic consequences would be expected. Construction and operation of the force main and pump station would not create any disproportionately high and adverse health and environmental effects on low-income and minority populations.

No-Action Alternative: Under the no-action alternative, treated wastewater would continue to be discharged to Beech Creek. This alternative would not meet the requirements of the Consent Agreement signed with the state of South Carolina Department of Health and Environmental Control.

CONCLUSION

Based on the findings of the EA, no significant impact is anticipated from implementation of either the proposed action or the Gum Swamp alternative. Therefore, issuance of a Finding of No Significant Impact (FONSI) is warranted, and an environmental impact statement (EIS) is not required. Pursuant to Executive Order (EO) 11988 and EO 11990, the authority delegated in Secretary of the Air Force Order (SAFO) 791.1, and taking the above information into account, I find that there is no practicable alternative to this action and that the proposed action includes all practicable measures to minimize harm to or within floodplain and wetland environments.

Bruce a. Wright

BRUCE A. WRIGHT
Lieutenant General, USAF
Commander, Air Combat Command

29 Dec '04

DATE

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ENVIRONMENTAL ASSESSMENT FOR EXTENSION OF WASTEWATER TREATMENT PLANT EFFLUENT FORCE MAIN AND DISCHARGE TO WATEREE RIVER FOR SHAW AIR FORCE BASE, SOUTH CAROLINA

Shaw Air Force Base
December 2004

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

This revised environmental assessment (EA) describes the potential environmental consequences from the extension of the existing Shaw Air Force Base (AFB) force main from its discharge location into Beech Creek to the Wateree River.

ENVIRONMENTAL IMPACT ANALYSIS PROCESS

This EA has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) (Public Law [P.L.] 91-190, 42 United States Code [USC] 4321 et seq.) as amended in 1975 by P.L. 94-52 and P.L. 94-83. In addition, this document was prepared in accordance with Air Force Instruction (AFI) 32-7061, which implements Section 102 (2) of NEPA and regulations established by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500-1508; 32 CFR Part 989).

PURPOSE AND NEED FOR ACTION

The purpose of this action is to extend the Shaw AFB Wastewater Treatment Plant (WWTP) effluent outfall line from the existing discharge into Beech Creek to a new discharge location at the Wateree River. This action is needed to relocate the existing treated effluent discharge from a low-flow receiving water stream to a higher flowing stream. The treated effluent discharge at Beech Creek has failed the copper and toxicity parameters several times and has resulted in a Notice of Violation (NOV) from the South Carolina Department of Health and Environmental Control (SCDHEC). Shaw AFB has entered into a consent agreement with the SCDHEC to comply with the copper discharge limits. Higher flow receiving streams, like the Wateree River, have higher discharge limits than low-flow streams like Beech Creek. Making this change would allow Shaw AFB to meet current discharge limits.

PROPOSED ACTION AND ALTERNATIVES

Shaw AFB proposes to extend its existing treated effluent force main to the Wateree River. The project would include acquiring a permanent easement for the force main and pump station, installing approximately 24,000 feet of force main and a new diffuser outfall structure, and constructing a 2.6 million gallon per day (mgd) pump station. In addition to the proposed action, which uses a route of the force main along U.S. Highway 76/378, this revised EA evaluates an alternative route through Gum Swamp, as well as the no-action alternative.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

This Revised EA provides an analysis of the potential environmental consequences associated with the proposed action, the Gum Swamp alternative, and the no-action alternative. Nine resource categories received thorough evaluation to identify potential environmental consequences. As indicated in Chapter 4.0, none of the alternatives would result in significant impacts to any resource area.

Land Use, Recreation and Visual Resources

Construction and operation of the pump station and force main would not result in any significant impacts to land use, recreation or visual resources either for the proposed action or Gum Swamp alternative.

Biological Resources

It is not expected that the proposed action or the Gum Swamp alternative would have an effect on species listed or proposed for listing in accordance with the Endangered Species Act (ESA), or on ESA critical habitat because the majority of the construction would occur within road rights-of-ways or along other corridors that have been previously disturbed. If the Gum Swamp alternative is chosen, a Section 404 permit for construction in wetlands would be required and complied with as a component of the project.

Cultural Resources

Construction activities are not expected to impact cultural resources at the proposed action or alternative route locations. Both areas have been inventoried for archaeological resources and no significant resources have been identified. Consultation with the State Historic Preservation Office (SHPO) has been initiated and compliance with the National Historic Preservation Act (NHPA) Section 106 would take place prior to project construction.

Water Resources

Construction and operation of the force main at the proposed action site would not be expected to appreciably affect the water quality of the Wateree River and would improve or not significantly deteriorate the water quality of Beech Creek. Currently the discharge to Beech Creek flows into the Wateree River and the proposal is to route the discharge directly to the Wateree River to provide greater dilution and less impact on the receiving stream. The amount of treated effluent currently discharged by the base would be approximately 0.25 percent of the average flows in the Wateree River.

With the proposed action and the Gum Swamp alternative, treated wastewater would no longer be discharged to Beech Creek. This action may improve water quality in the creek by reducing copper levels and would reduce flows in that portion immediately downstream of the existing outfall.

For the proposed action approximately 1,160 feet of the force main would be within the 100-year floodplain of the Wateree River. Under the Gum Swamp alternative about 12,000 feet would be constructed within the floodplain. There is no practicable alternative, however, that would not involve construction in the floodplain. No adverse environmental consequences are anticipated from the construction with either alternative.

Earth Resources

Standard construction practices would be applied to control sedimentation and erosion during construction, thereby avoiding secondary effects to any wetlands or freshwater aquatic communities.

Air Quality

Construction-related air emissions would result in minimal change in air quality for either the proposed action or the Gum Swamp alternative. There would be no adverse impacts to air quality. This area is in attainment; therefore, a formal air quality conformity determination is not required.

Infrastructure

Implementation of either the proposed action or the Gum Swamp alternative would have no adverse effects on the potable water and wastewater infrastructure. Construction activities may temporarily close one lane to vehicles traveling on Claremont and Garners Ferry Roads and U.S. Highway 76/378. The construction contractor would provide appropriate traffic control and given the low traffic volumes, no adverse impacts are anticipated.

Noise

Implementation of either the proposed action or the Gum Swamp alternative would have minor, temporary increases in localized noise levels in the vicinity of the project area during construction. Noise impacts would be similar to typical construction noise, and last only the duration of the specific construction activities. The noise disruptions would be temporary and would be limited to daytime hours; therefore, impacts are considered insignificant.

Socioeconomics and Environmental Justice

Construction activity, employment, and earnings associated with the proposed action and the Gum Swamp alternative would be very similar. No adverse environmental consequences would be expected. Construction and operation of the upgrades to the treated effluent force main extension and pump station would not create any disproportionately high and adverse health and environmental effects on low-income and minority populations.

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

Shaw Air Force Base (AFB) proposes to extend its wastewater treatment plant effluent discharge line from Beech Creek to a new discharge point on the Wateree River. This revised environmental assessment (EA) has been prepared to analyze the potential environmental consequences associated with the proposed action and alternatives in accordance with the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 *et seq*.) and its implementing regulations.

Section 1.2 provides background information on Shaw Air Force Base (AFB). The purpose and need for the proposed action is described in Section 1.3. A detailed description of the proposed action, alternatives, and the no-action alternative are provided in Chapter 2.0. Chapter 3.0 describes the existing conditions of various environmental resources that could be affected if the proposal were implemented. Chapter 4.0 describes how those resources would be affected by implementation of the proposed action and alternatives, or the no-action alternative. Chapter 5.0 addresses the cumulative effects of the proposed action, as well as other recent past, current, and future actions that may be implemented in the region of influence (ROI) for the proposed action.

1.2 BACKGROUND

Shaw AFB is located in the east central part of South Carolina, approximately 35 miles east of the capital city of Columbia. The base is located within the city limits of Sumter and is 10 miles west of the city's center (Figure 1-1). The City of Sumter is in Sumter County, which is naturally bounded by the Wateree River to the west and the Lynches River to the east. The county has a mixture of farmland, forested areas and wetlands with the main population center in and around the city of Sumter. Associated with the base is the 12,400-acre Poinsett Electronic Combat Range (ECR), located approximately 15 miles from the base in the vicinity of the town of Wedgefield, South Carolina.

The 20th Fighter Wing (20 FW), the base host wing, operates the 55th, 77th, and 79th Fighter Squadrons, and has the primary mission to provide and sustain combat ready air forces. Headquarters 9th Air Force is the major tenant at Shaw AFB. General goals of the base are to sustain the resources and relationships deemed appropriate to pursue national interests, and provide for the command, control, and communications necessary to execute the missions of the United States Air Force (Air Force), Air Combat Command (ACC), 9th Air Force, and the 20 FW. Shaw's primary mission aircraft is the F-16 "Fighting Falcon" Block 50 aircraft, a single-seat, single-engine, all-weather, multi-role tactical fighter designed to perform in both air-to-air and air-to-ground roles.

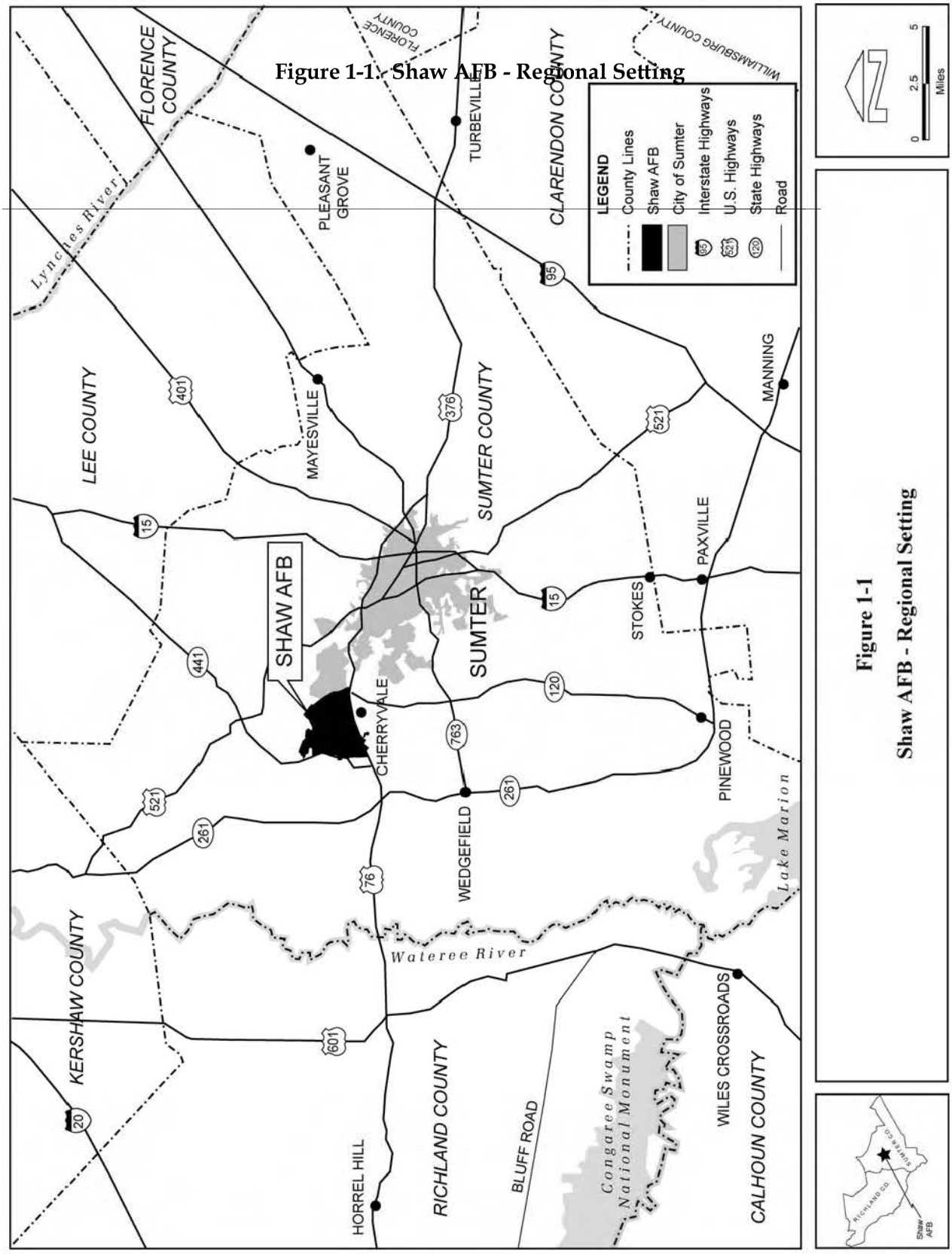


Figure 1-1. Shaw AFB - Regional Setting

1.3 PURPOSE AND NEED

The purpose of this action is to extend the Shaw AFB treated wastewater treatment plant effluent discharge line from the existing outfall at Beech Creek to a new outfall at the Wateree River (Figure 1-2). The project would include acquiring a permanent easement/encroachment permit for the force main and pump station, installing approximately 24,000 feet of force main, and constructing a pump station. This action is needed to relocate the existing treated effluent discharge outfall from a low-flow receiving water stream to a higher flowing stream. The treated effluent discharge at Beech Creek has failed the copper and toxicity parameters several times and has resulted in Notices of Violation (NOVs) from the South Carolina Department of Health and Environmental Control (SCDHEC). Shaw AFB has entered into a Consent Agreement (01-103-W) with the SCDHEC (SCDHEC 2001) to comply with the copper discharge limits. Higher flow receiving streams, like the Wateree River, have higher discharge limits than low-flow streams like Beech Creek. Making this change would allow current discharge limits that Shaw AFB can meet.

This project was selected after an evaluation of 13 different options to comply with the copper wastewater discharge standard. A list of the alternatives considered is presented in section 2.4.

Figure 1-2. Location of Proposed Sewer Outfall Routes

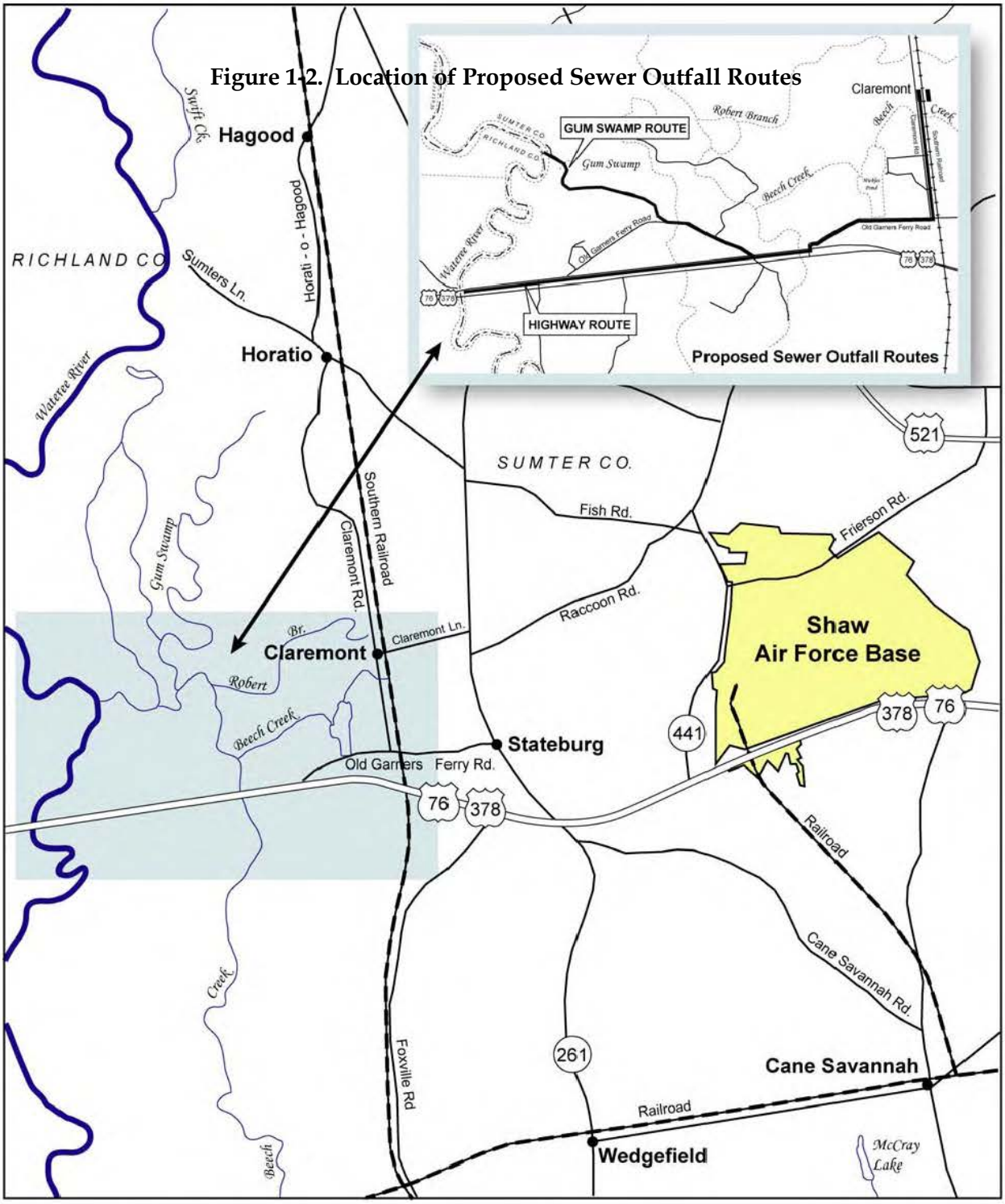


Figure 1-2

Location of Proposed Sewer Outfall Routes
Sumter County, South Carolina

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

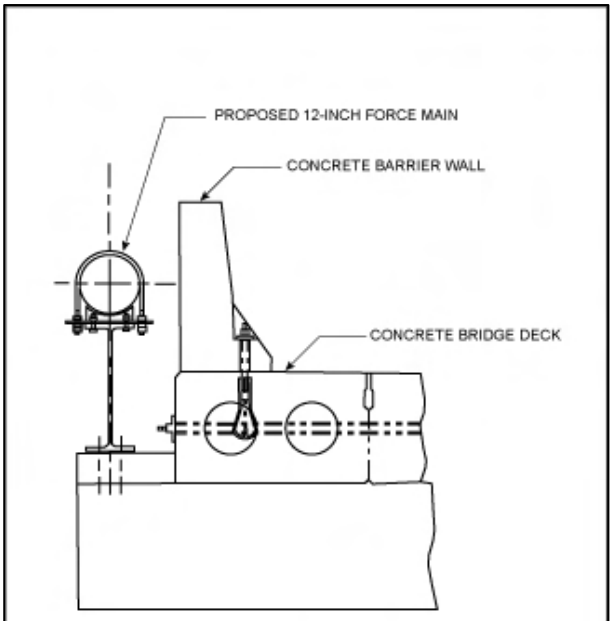
Shaw AFB proposes to extend its existing treated wastewater treatment plant effluent discharge to the Wateree River. In addition to the proposed action, this revised EA evaluated an alternative route and the no-action alternative.

2.1 PROPOSED ACTION – U.S. HIGHWAY 76/378 ROUTE

The proposed action is to install approximately 24,000 feet of a new force main and a new pump station to transport treated wastewater effluent generated at the Shaw AFB wastewater treatment plant (WWTP) for discharge into the Wateree River. Currently treated wastewater discharges into a ditch that runs to Beech Creek under permit number SC 0024970 from the SCDHEC, with a maximum daily discharge rate of 1.2 million gallons.

Force Main. As depicted on Figure 2-1, the 12-inch high density polyethylene force main would be constructed along the east side of Claremont Road and extend to the south side of Old Garners Ferry Road. At Old Garners Ferry Road, the force main would turn west and follow Old Garners Ferry Road to its intersection with the westbound lanes of United States (U.S.) Highway 76/378. The force main would be installed on the south side of the westbound lanes of U.S. Highway 76/378 and extend west and discharge into the Wateree River.

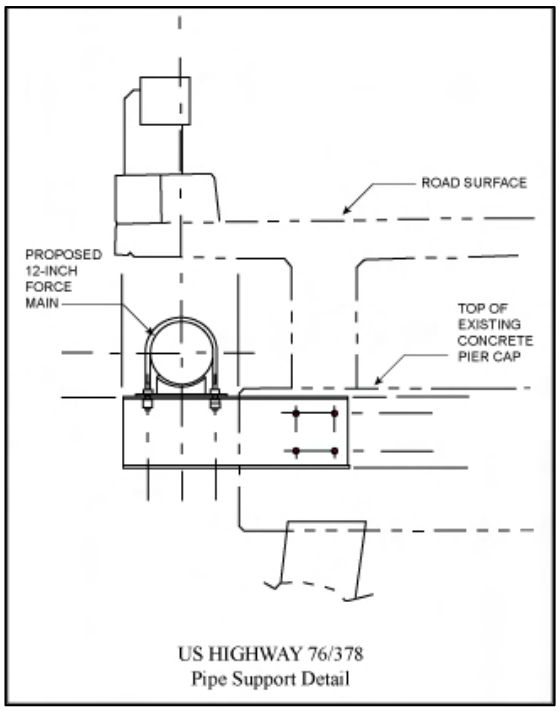
Construction along Claremont Road, approximately 5,600 feet, would be within the existing 66-foot right-of-way, no more than 5 feet from the edge of the existing pavement and would require crossing Beech Creek. The preferred method of crossing the creek would be by attaching the pipe to the bridge over the creek in accordance with South Carolina Department of Transportation (SC DOT) standards. An alternative method of crossing the creek would be to span the creek with the pipe support by one or two concrete pilings. The majority of the right-of-way is cleared although construction may require removal of some trees in portions of the right-of-way.



CLAREMONT ROAD BRIDGE
Pipe Support Detail

Construction along Old Garners Ferry Road, approximately 6,400 feet, would take place on the southern edge of the road within the 50–foot right-of-way. Along the south side of the road is

an overgrown drainage ditch, and the force main would be placed between the edge of the pavement and this ditch in order to reduce the amount of vegetation disturbed by construction. A portion of Old Garners Ferry Road is not paved and along this portion the force main would be constructed along the edge of the road not requiring the removal of any vegetation.



US HIGHWAY 76/378
Pipe Support Detail

At the intersection of Old Garners Ferry Road and U.S. Highway 76/378, the force main will be bored under U.S. Highway 76/378 to minimize disturbance to the road surface and to traffic. Along U.S. Highway 76/378, the force main would be placed in a trench approximately 4 feet from the southern edge of the westbound lanes of the road, with the exception of three locations where the road is elevated over two unnamed creeks and Beech Creek. At these locations, the force main would be encased in a ductile iron pipe and attached to the existing concrete bridge structure in accordance with SCDOT standards. Each of these bridges is approximately 600 to 1,000 feet long.

In all cases the force main would be placed in a trench approximately 24 to 30-inches wide with a minimum of 3 feet of cover. For construction, a 50-foot wide easement along the entire length of the pipeline would be obtained. A 15-foot wide permanent easement or encroachment permit, within the 50-foot area, would be acquired by the Air Force for operation and maintenance of the force main and pump station. Two driveways on the east side of Claremont Road providing access to agricultural fields would be temporarily disrupted and the construction contractor would coordinate construction activities to keep one of the driveways available at all times.

Pump Station. The proposed location (see photo above) for the new pump station (468 square feet) would require a permanently fenced cleared area of approximately 70 feet by 140 feet and

2-1. Highway Route
Proposed Sewer Outfall Route

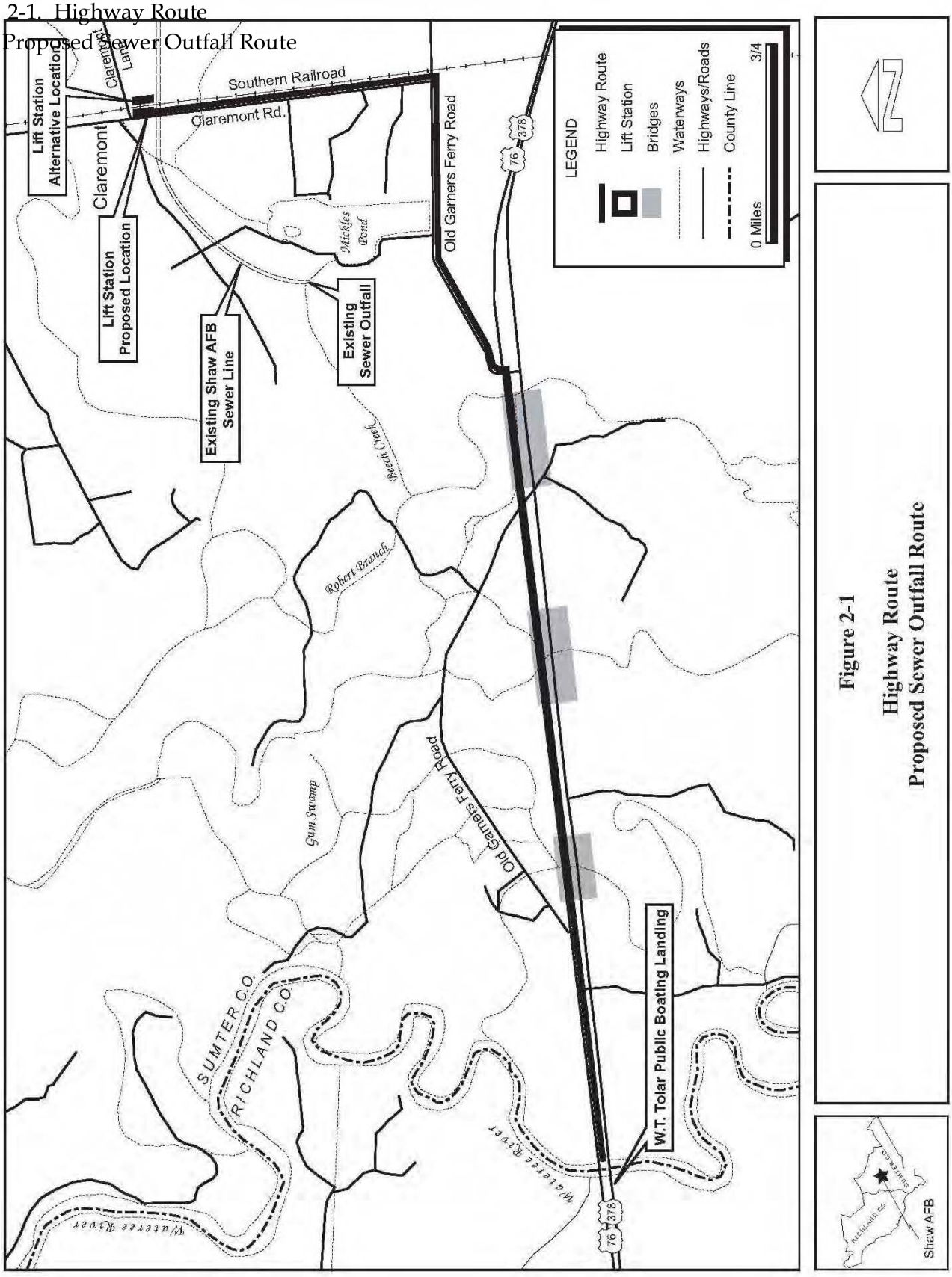
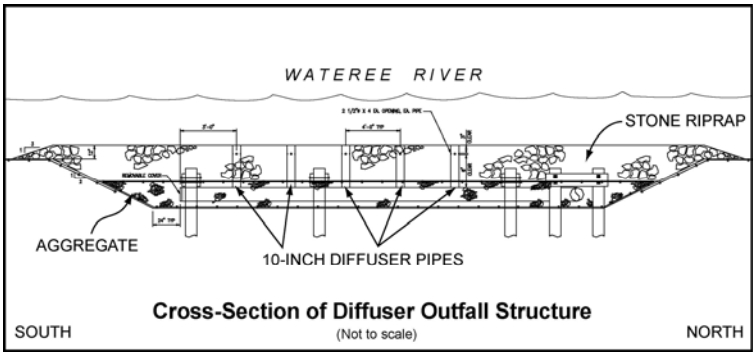


Figure 2-1
Highway Route
Proposed Sewer Outfall Route

a fenced area approximately 54 feet by 100 feet. An emergency generator with an aboveground double-walled diesel storage tank would be installed to provide back-up power when the commercial power supply fails. A water well would be installed at the pump station site to provide non-potable water for wash-down, clean-up and other sanitation needs. The proposed action location is along the east side of Claremont Road just south of its intersection with Claremont Lane and west of the Norfolk Southern Railroad as shown in Figure 2-2. The proposed location is vacant and no evidence of any past use has been identified. This location is just north of the location of the existing sewer line crossing of Claremont Road. The existing 24-inch gravity sewer line would be connected to the pump station and be available for use in case of an emergency.

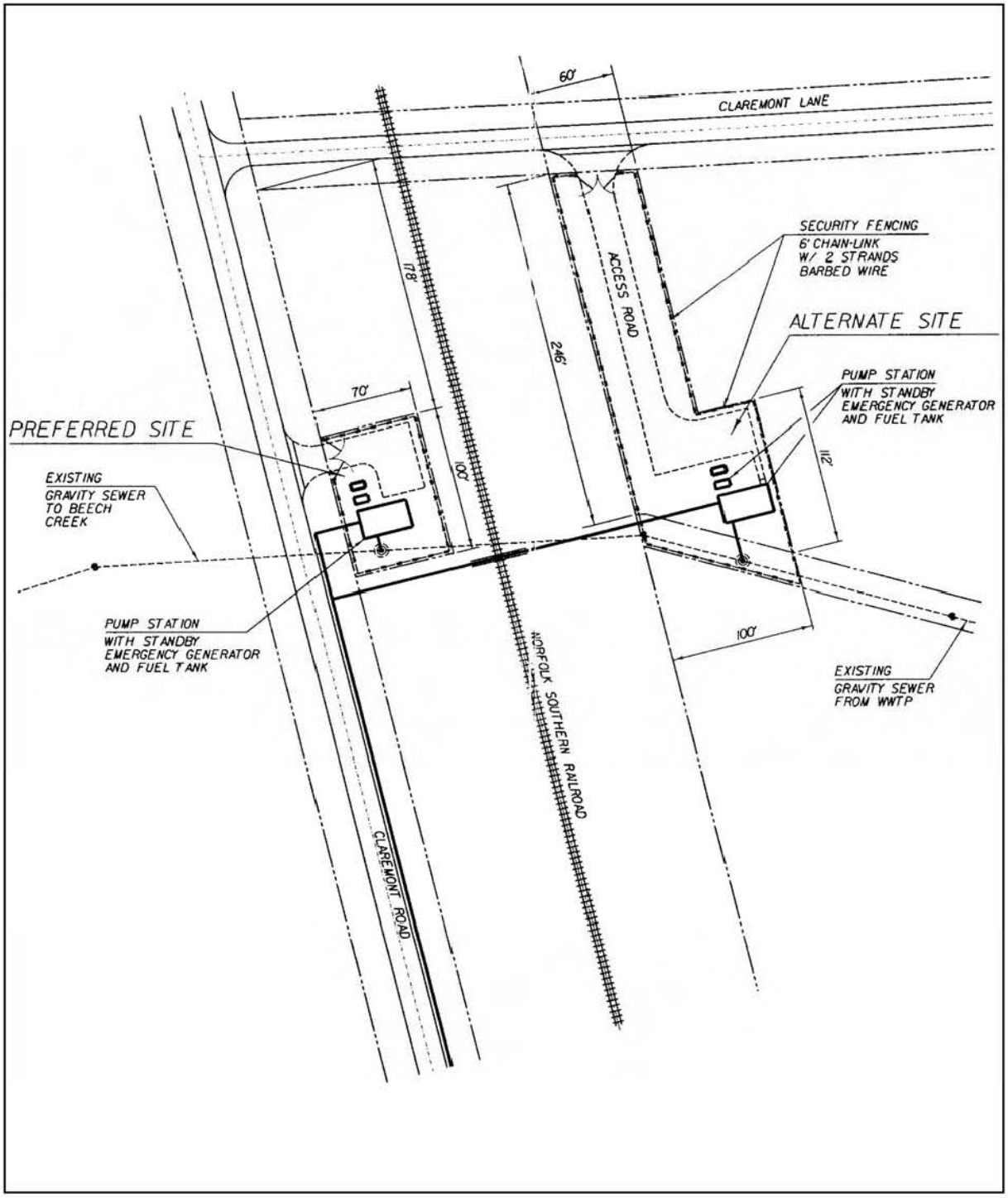
An alternative location for the pump station (see photo above) has been identified just east of the Norfolk Southern Railroad as shown in Figure 2-2. Access to the alternate location would be from Claremont Lane. A 220-foot access road would be established and an area approximately 100 feet by 112 feet would be acquired for construction and access to the existing 24-inch gravity sewer.

Wateree River Diffuser Outfall Structure. A diffuser outfall structure would be constructed within the bed of the Wateree River to provide instantaneous mixing of the treated wastewater with the river. The outfall structure would consist of approximately 20 feet of force main with five perforated vertical diffusers. The force main would be anchored to the river bottom with the use of timber piles. The force main and the perforated vertical diffusers would be placed in a bed of aggregate and stone riprap.



Cross-Section of Diffuser Outfall Structure
(Not to scale)

The treated wastewater would flow through the force main and be dispersed into the river from five diffusers over a distance of 20 feet. In order to construct the outfall structure, a cofferdam would be established around the perimeter of the area within the river to be excavated. The



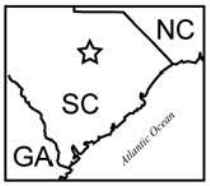
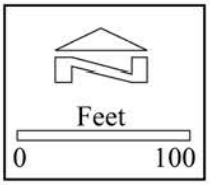
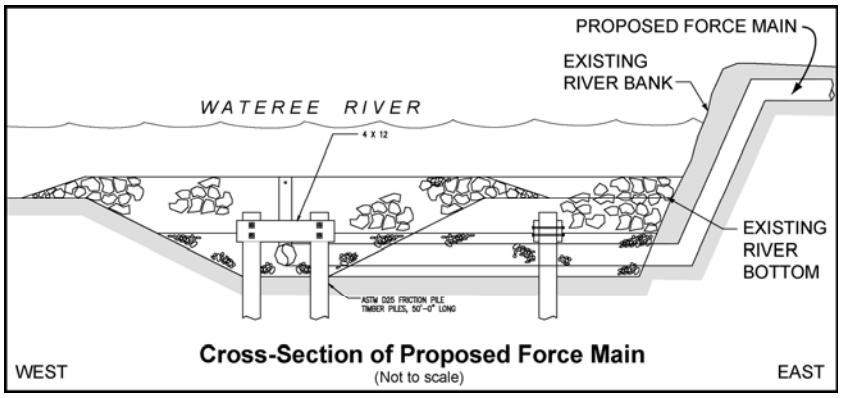


Figure 2-2

Pump Station Site Plan
Shaw AFB, Sumter, South Carolina



area would consist of approximately 1,300 square feet and excavation would require removal of about 150 cubic yards of river sediments, which would be disposed of in accordance with South Carolina and federal regulations. A geotextile fabric would line the excavation and the aggregate to help stabilize the structure.



Cross-Section of Proposed Force Main
(Not to scale)

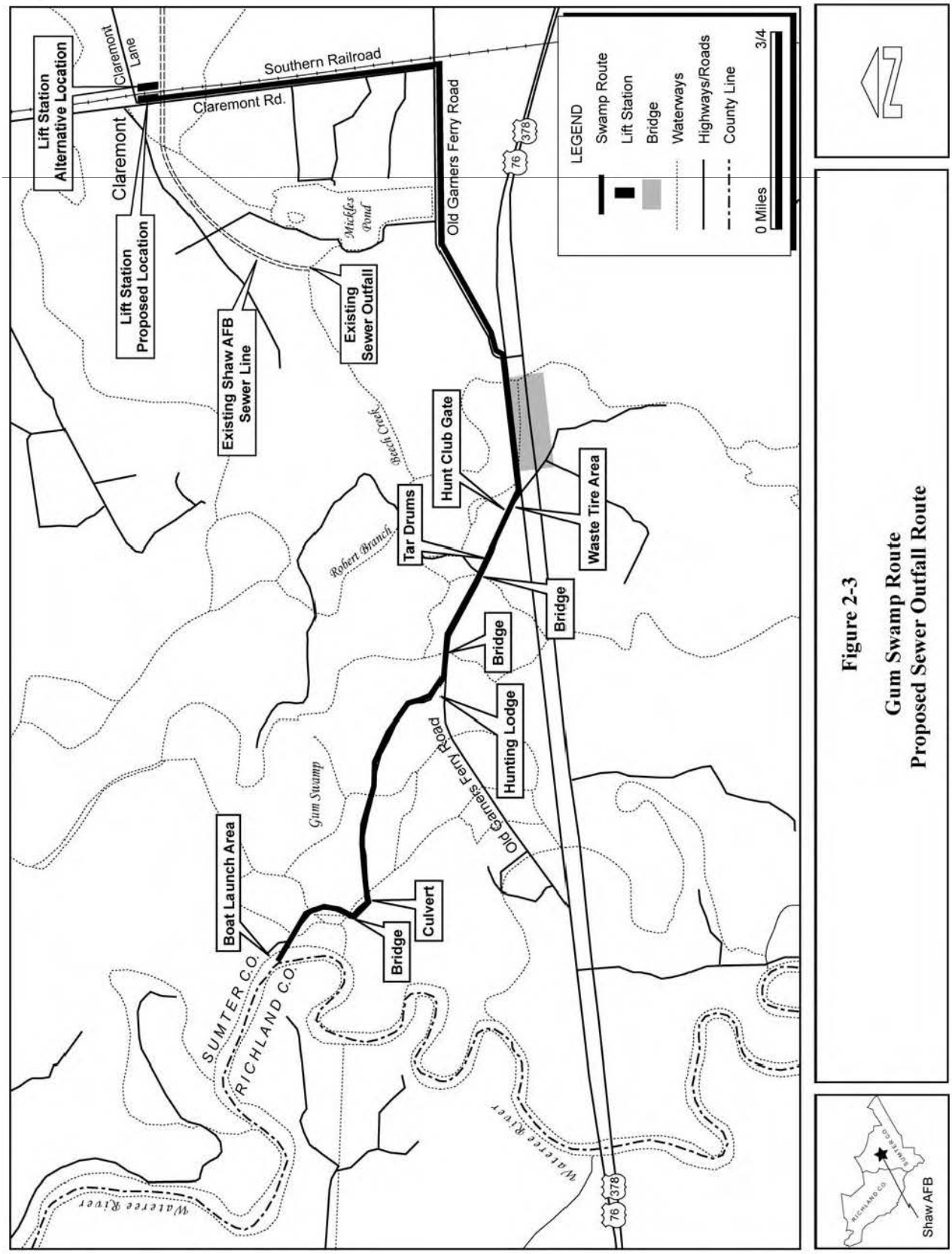
Construction is anticipated to begin January 2005 and be completed December 2005. An erosion sedimentation control plan would be prepared by the project contractor for the entire project, in accordance with South Carolina storm water requirements, to reduce the potential effect to nearby surface waters, wetlands, and upland habitats. Prior to the start of construction, the contractor would install silt fences and erosion bales to reduce off-site siltation in accordance with approved erosion control plan. During construction ditches and slopes would be excavated with rounded features to prevent unnecessary erosion. For soil erosion control native grasses and forbs would be used in seed mixes and certified weed-free mulch would be applied for stabilizing the disturbed areas.

2.2 GUM SWAMP ALTERNATIVE ROUTE

Under this alternative, the construction of the treated wastewater effluent force main and pump station would start at the same location identified in the proposed action. The force main would be extended along Claremont Road to Old Garners Ferry Road. The force main would be further extended along the south side of Old Garners Ferry Road to its intersections with U.S. Highway 76/378. The force main would be constructed within the shoulder of the highway, and where the highway crosses Beech Creek; the force main would be attached to the bridge structure in accordance with SCDOT requirements.

Approximately 1,000 feet past the bridge over Beech Creek, the force main would veer off U.S. Highway 76/378 and follow Old Garners Ferry Road to the northwest through property owned by International Paper. The force main would be constructed along the edge of the road requiring the removal of three to five feet of vegetation. After approximately 4,000 feet, Old Garners Ferry Road turns to the southwest. At this point, the force main would continue to the northwest following logging roads maintained by International Paper. The force main would cross three streams supported by footings on each stream bank. Occasional flooding of Gum Swamp along this route may severely hamper construction, which could cause construction delays that would prevent meeting the consent order construction deadline. The force main would extend to the Wateree River and discharge into the river as shown in Figure 2-3. It is anticipated that along the entire route the force main would be placed in a trench

Figure 2-3. Gum Swamp Route



approximately 24 to 30-inches wide with a minimum of 3 feet of cover. Construction is anticipated to begin in January 2005 and be completed by December 2005. All construction details and construction standard practices identified in the description of the proposed action would also be included in the execution of this alternative route.

2.3 NO-ACTION ALTERNATIVE

Under the no-action alternative, the force main would not be extended to the Wateree River. Shaw AFB would not meet the requirements of reducing the amount of copper entering Beech Creek as stated in the Consent Agreement with SCDHEC.

2.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

In addition to the proposed action and alternatives discussed above, other alternatives were evaluated but eliminated from further consideration. These alternatives were reviewed in a study entitled *Evaluation of Options to Comply With Copper Discharge Standards for Shaw AFB* (Air Force 2002) and are summarized below. Each alternative was evaluated in its ability to successfully meet the copper discharge standard of 9.7 micrograms/liter (µg/l). The evaluation included technical feasibility and timeliness (see Table 2-1). The following alternatives were:

- ***On-site land application.*** Re-route Shaw AFB treated wastewater effluent discharge to a new or existing wet weather holding pond (193 acre-feet) on base with subsequent pumping to a subsurface disposal system.
- ***Optimize lime, soda ash, and phosphate treatment to create more buffering capacity and increase water hardness in distribution and at the effluent.*** Treatment at well with reverse osmosis, ion exchange, and/or chemical precipitation.
- ***Regional wastewater connection.*** Purchase all base wastewater treatment from the city of Sumter.
- ***Regional water connection.*** Purchase water from the City of Sumter or High Hills Rural Water.
- ***Well field management.*** Produce more water from wells with lower concentrations of copper.
- ***Upgrade source quality.*** Drill wells to the deeper Middendorf aquifer.
- ***Centralized Blending.*** Construct distribution piping, pumps and storage to blend waters with different concentrations of copper.
- ***Water Treatment Modification.*** Optimize lime, soda ash, and phosphate treatment to create more buffering capacity and increase water hardness.

- ***Treatment at Waste Water Treatment Plant.*** Addition of lime to increase pH and precipitate copper plus increase effluent hardness.
- ***Treatment at Wells.*** Reverse osmosis, ion exchange, and chemical precipitation to remove copper and increase hardness to reduce corrosivity.
- ***Industrial Discharge Minimization.*** Eliminate source of heavy metal introduced into distribution system from base industrial shops.
- ***Monitoring Modification.*** Change the monitor point downstream of the combined WWTP and remediation system flow.

Table 2-1. Technical Feasibility and Timeliness of Alternatives

Alternative	*Technical Feasibility*[1]	*Timing*[1]
On-Site Land Application	L[2]	L
Optimize lime, soda ash, and phosphate treatment to create more buffering capacity and increase water hardness in distribution and at the effluent	M	L
Regional Wastewater Connection	L	H
Regional Water Connection	L	H
Well Field Management	H	L
Upgrade Source Quality	H	L
Centralized Blending	H	L
Water Treatment Modification	H	L
Treatment at WWTP	H	L
Treatment at Wells	M	L
Industrial Discharge Minimization	H	L
Monitoring Modification	H	L
Extension to Discharge Pipe (Proposed Action)	L	L

1. L = low risk; M = medium risk; H = high risk.
2. With an increased potential of bird strikes to aircraft with on-site land application this alternative is not preferred.

The first four alternatives were identified as having a high potential for technically meeting the copper standard (Air Force, 2002). However, the first alternative, On-Site Land Application is not a preferred alternative as this activity has the potential to increase bird strikes to military aircraft and increase flight safety concerns. The alternative would require a new or expanded

wet weather holding pond, which would draw birds to the area that would increase flight safety risk. Optimization of Treatment Systems would require additional study to determine if the groundwater treatment system would be able to meet trichloroethylene discharge standards. Neither the Regional Wastewater Connection nor the Regional Water Connection alternatives would be accomplished within the timeframe identified in the consent agreement. All other alternatives, upon more through examination, were determined to be incapable of meeting the copper discharge standard.

2.5 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The environmental impact analysis process (EIAP) includes the review of all information pertinent to the proposed action and reasonable alternatives and provides a full and fair discussion of potential consequences to the natural and human environment. The process includes involvement with the public and agencies to identify possible consequences of an action, as well as the focusing of analysis on environmental resources potentially affected by the proposed action or alternatives.

2.5.1 Public and Agency Involvement

In March 2003, the Air Force contacted local, state, tribal, and federal agencies to inform them of the Air Force intent to prepare an EA for the extension of the treated wastewater effluent force main to the Wateree River (refer to Appendix A). Through this scoping process, the Air Force obtained information regarding pertinent environmental issues the agencies and governments felt should be addressed in the environmental impact analysis.

To facilitate public involvement in this project, the Air Force published an advertisement in the local newspaper on October 12, 2004 and November 28, 2004, announcing the availability of the Draft EA and a revised Draft EA, respectively, for public and agency review. Copies of responses received on the Draft EA are found in Appendix A.

2.5.2 Regulatory Compliance

This revised EA has been prepared to satisfy the requirements of NEPA (Public Law [P.L.] 91-190, 42 USC 4321 et seq.) as amended in 1975 by P.L. 94-52 and P.L. 94-83. The intent of NEPA is to protect, restore, and enhance the environment through well-informed federal decisions. In addition, this document was prepared in accordance with Air Force Instruction (AFI) 32-7061, which implements Section 102 (2) of NEPA and regulations established by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500-1508; 32 CFR Part 989).

Implementation of the proposed action or an alternative would require concurrence from several regulatory agencies. Compliance with the ESA involves communication with the Department of the Interior (delegated to the U.S. Fish and Wildlife Service [USFWS]) in cases where a federal action could affect the listed threatened or endangered species, species proposed for listing, or species that could be candidates for listing. A letter was sent to the

USFWS, as well as their state counterparts, informing them of the proposed action and alternatives and requesting data regarding applicable protected species. Since no adverse effects are anticipated, further consultation is not required. Appendix A includes copies of relevant coordination letters.

2.5.3 Permit Requirements

This revised EA has been prepared in compliance with NEPA; other federal statutes, such as the ESA, the Clean Air Act (CAA) and the Clean Water Act (CWA); Executive Orders (EOs), and applicable state statutes and regulations. Table 2-2 summarizes applicable federal, state, and local permits.

Table 2-2. Regulatory Requirements

Type of Permit or Regulatory Action	*Requirement*	*Agency*
Endangered Species Act	Required to consult on impacts of project implementation on federally listed or proposed threatened and endangered species	USFWS; South Carolina Department of Natural Resources (SCDNR)
National Historic Preservation Act (NHPA) Section 106	Consultation with State Historic Preservation Office (SHPO) and Notification to Advisory Council on Historic Preservation (ACHP)	South Carolina SHPO
National Pollutant Discharge Elimination System (NPDES) permit	South Carolina Storm Water Management and Sediment Reduction Act CWA; South Carolina Pollution Control	SCDHEC, Bureau of Water, Division of Industrial, Agricultural and Storm Water Permitting
South Carolina Storm Water Management and Sediment Reduction Act	Storm Water Erosion Control	SCDHEC Bureau of Water
Wastewater Construction Permit	Permit required to construct wastewater transportation facilities	SCDHEC Bureau of Water
Wastewater Facility Operating Permit	Permit required to operate wastewater transportation facilities	SCDHEC Bureau of Water
Clean Water Act, Section 401 & 404 Permits	Required for authorizing construction (401) and fill (404) within wetlands or waters of the United States	U. S. Army Corps of Engineers (USACE), Charleston District
Navigable Waters Permit SCR 19-450	Construction of an outfall in a navigable waterway	USACE, Charleston District/SC DHEC Bureau of Water
Encroachment Permit	Construction in road right-of-way	South Carolina Department of Transportation

2.6 COMPARISON OF ALTERNATIVES

Table 2-3 summarizes the potential environmental impacts of the proposed action and alternatives, based on the detailed impact analyses presented in Chapter 4.0.

Table 2-3. Summary of Potential Environmental Consequences

Resources	*Proposed Action*	*Alternative One*	*No-Action*
Land Use Recreation and Visual Resources	Compatible with surrounding land use. Limited visual effects from pump station and discharge structure construction.	Compatible with surrounding land use. Limited visual effects from pump station construction and discharge.	No change to current land use status; no impacts to land use.
Biological Resources	Negligible impacts to wildlife and native habitats. No impacts to federally-listed, threatened, or endangered species or critical habitat.	Negligible impacts to wildlife and native habitats. Direct impact to 5-9 acres of wetlands. Section 404 permit from USACE. No impacts to federally listed, threatened, or endangered species or critical habitat.	No change to biological resources.
Cultural Resources	South Carolina consultation ongoing. No impacts to archaeological or traditional resources. Compliance with NHPA Section 106 would take place prior to project coordination.	South Carolina consultation ongoing. No impacts to archaeological or traditional resources. Compliance with NHPA Section 106 would take place prior to project coordination.	No change to historic architectural resources, archaeological resources, or traditional resources.
Water Resources	Approximately 0.4 acres of disturbance within the 100-year floodplain. New discharge to Wateree River.	Approximately 4.13 acres of disturbance within the 100-year floodplain. New discharge to Wateree River.	Continued discharge to Beech Creek.
Earth Resources	Negligible impacts from construction activities.	Negligible impacts from construction activities.	No changes to earth resources.
Air Quality	Does not exceed *de minimis* levels.	Does not exceed *de minimis* levels.	No change in current operations; no changes in air quality.
Infrastructure	Minimal impacts from construction activities.	Minimal impacts from construction activities.	Continued discharge to Beech Creek.
Noise	Negligible impacts from construction activities.	Negligible impacts from construction activities.	No change in noise levels.
Socioeconomics and Environmental Justice	No new employment. No long-term economic changes.	No new employment. No long-term economic changes.	No change in employment, population, or demand for additional housing.

3.0 AFFECTED ENVIRONMENT

This chapter describes the affected environment in the project area and the potentially affected region. Based on the operational characteristics of the proposed action (Chapter 2.0), it was determined that the following resources could possibly be affected: noise, air quality, land use, biological resources, cultural resources, and socioeconomics and environmental justice. The existing environmental conditions within the expected geographic extent of potential impacts, known as the Region of Influence, are addressed for each environmental resource in this chapter.

RESOURCES ELIMINATED FROM DETAILED CONSIDERATION

Several resources were not evaluated in this revised EA because it was determined that implementation of the proposed action is unlikely to affect them. These resources include airspace, safety, and solid and hazardous materials and waste.

Airspace. The proposed action and alternatives do not involve aircraft operations.

Safety. The proposed action involves a common construction practice that presents no extraordinary hazards that cannot be dealt with by normal jobsite safety procedures.

Solid and Hazardous Materials and Waste. The implementation of the proposed action or alternatives would not generate any specific solid or hazardous wastes and the routes investigated would not traverse any area that appears to have been contaminated by past practices.

3.1 LAND USE, RECREATION, AND VISUAL RESOURCES

3.1.1 Definition of the Resource

The attributes of land use addressed in this analysis include land use, recreation, and visual resources. Land use focuses on general land use patterns (including recreational areas), ownership, management plans, policies, ordinances, and regulations. These provisions determine the types of uses that are compatible and identify appropriate design and development standards to address specific designated or environmentally sensitive areas. Visual resources present the natural and manufactured features that constitute the aesthetic qualities of an area. The ROI for land use, recreation and visual resources is the corridor approximately 50 feet on either side of the proposed force main routes including the pump station site.

3.1.2 Existing Conditions

LAND USE

Sumter County, located in east central South Carolina, is the home of Shaw AFB and the City of Sumter (refer to Figure 1-1). Land uses within Sumter County include agriculture and forestry, with more than 50 percent of the county classified as prime farmland or farmlands of statewide importance (Air Force 1996). Special use areas within Sumter County, in the vicinity of the base, include Poinsett State Park, a portion of Woods Bay State Park, the Manchester State Forest (including a Wildlife Management Area [WMA]), and a portion of a 44,000-hectare Lake Marion impoundment. The Sumter County Comprehensive Plan 1999-2020 provides land use planning goals and constraints for the project area. Sumter County, in conjunction with Shaw AFB, also prepared a Joint Compatible Land Use Study that describes existing land uses; recommends modifications to the county zoning ordinance; addresses long-range infrastructure improvements and describes 20-year growth trends for the area (Robert and Company 1994).

Land use in the vicinity of the existing wastewater discharge to Beech Creek is primarily privately owned agricultural areas. Properties on both sides of Claremont Road are agricultural with crops (cotton) or pine tree plantations. A Norfolk Southern railroad line is located parallel to Claremont Road. Properties on the north and south sides of Claremont Lane are primarily agricultural with a few private homes. Properties north of Old Garners Ferry Road are either currently undeveloped or agricultural. An Alltel cell phone tower has been recently installed on the northwest corner of Old Garners Ferry and Claremont Roads. Currently all property in this corridor is zoned agricultural conservation (personal communication, Dinkins 2002). Historical aerial photographs indicate areas both north and south of Old Garners Ferry Road were used as borrow pits in the past (Natural Resources Conservation Service [NRCS] 1963). Claremont Road is a two-lane road with a pavement width of 25 feet and a right-of way of 66 feet. Claremont Lane is a two-lane road with a pavement width of 25 feet and a right-of way of 50 feet. Old Garners Ferry Road is a two-lane road with a pavement width of approximately 22 feet and a right-of-way of 50 feet.

Lands north of U.S. Highway 76/378, between Old Garners Ferry and the Wateree River, are owned by International Paper and are used for the production of pulpwood. These lands are also leased to the Eastover Hunt Club. There are no other land uses, commercial or industrial, along the north side of U.S. Highway 76/378 as the entire area is within the floodplain of the Wateree River. An underground optical cable line from Farmers Telephone Corporation (also known as Palmetto Net, Inc.) runs along the northern and southern edges of U.S. Highway 76/378. The cable line has a warning not to dig within 2½ feet of the line.

Shaw AFB is located approximately 4 miles east of the project area in the City of Sumter, South Carolina. The Shaw AFB General Plan provides an overall perspective concerning development opportunities and constraints and provides a framework for making effective programming, design, construction, and resource management decisions. The Shaw AFB 1994-2020 Comprehensive Plan provides goals for guiding and shaping development on base.

Zoning around the base includes heavy industrial and limited commercial. Varying degrees of residential densities are permitted around the base and general commercial businesses are permitted along the major roads. To the north, northwest, and southeast, residential developments surround the base (Air Force 1996). On the major roads, including U.S. Highways 76/378 and 521 and State Route (SR) 441, commercial development occurs.

RECREATION

Within Sumter County there are two important recreational facilities: Poinsett State Park and Manchester State Forest. However neither is within the project area. Poinsett State Park is located in central South Carolina near Wedgefield, 18 miles southwest of Sumter. The park is located in an outlying area of the Sandhills, within the coastal plain. The facilities and activities include a campground, picnic shelters, nature center, hiking, equestrian and biking trails, and fishing, swimming and boating (South Carolina Department of Parks, Recreation, and Tourism n.d.a).

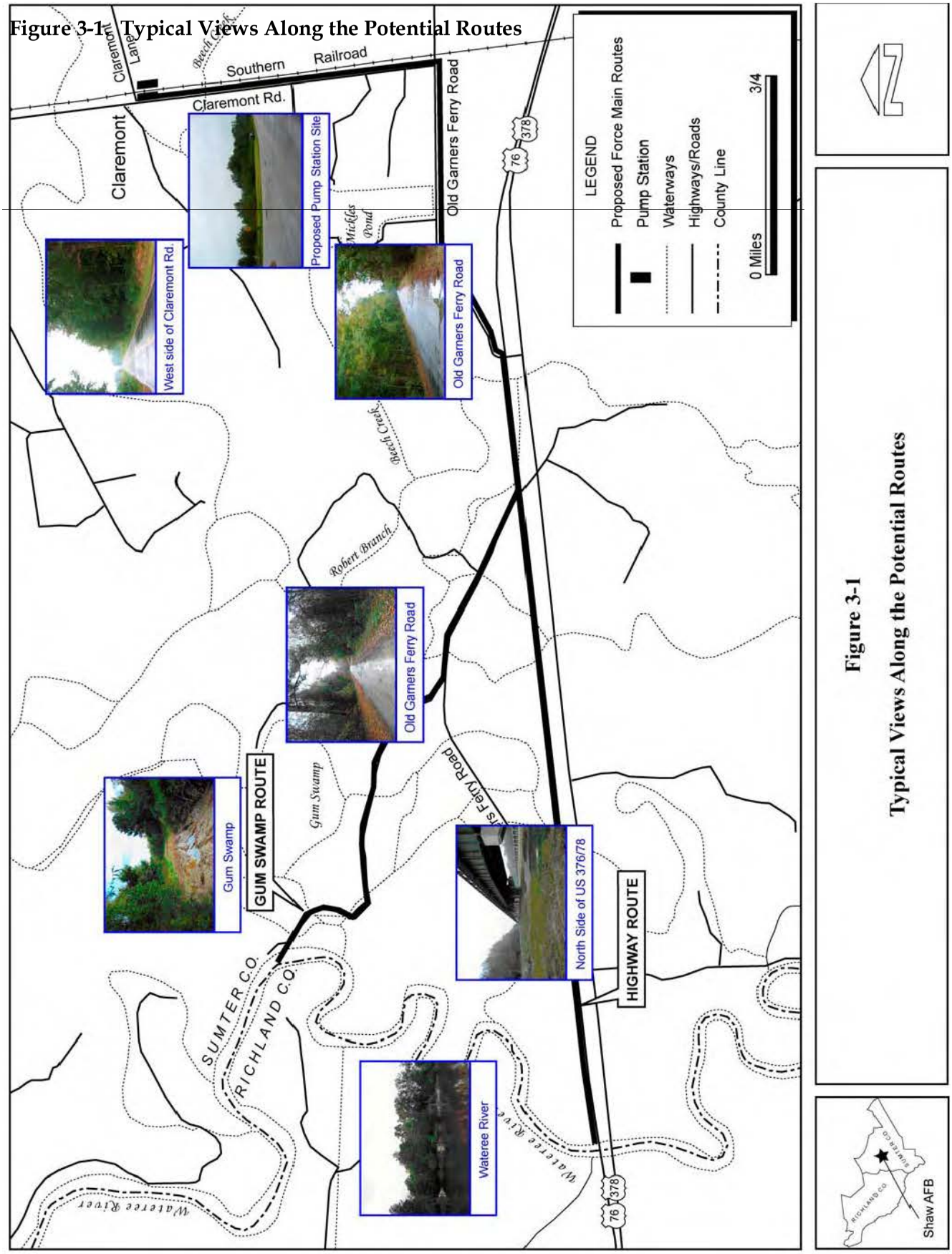
Manchester State Forest, in Sumter and Clarendon Counties, consists of approximately 25,000 acres of mixed pine and hardwood species native to the midlands of South Carolina. The forest is managed to consider multiple uses including enhancing timber production, fish and wildlife habitat, air and water quality, soil conservation, scenic beauty, scientific research, and recreational opportunities. Manchester State Forest is included in the WMA Program through a cooperative agreement between the Department of Natural Resource and the South Carolina Forestry Commission (South Carolina Forestry Commission n.d.). Hunting and fishing with a permit/license are permitted.

Two boat ramps on the Wateree River are located adjacent to the project area (Figures 2-1 and 2-3). Along the western side of the Wateree River on U.S. Highway 76/378, the W. T. Tolar Public Boating Landing provides access to the Wateree River. There also is a private boat ramp on the east side of the Wateree River on the property owned by International Paper approximately 1,000 feet upstream of the U. S. Highway 76/378 bridge.

VISUAL RESOURCES

Sumter County, in the project vicinity, is characterized by a mixture of large tracts of agricultural land interspersed with low-density residential development and homesteads (Figure 3-1). With a long history of pine plantations, the landscape is broken up with tracts of pine trees of varying age and height mixed with agricultural crops. The area is generally flat, with drainages cutting through the fields as they discharge into the floodplain of the Wateree River. As U.S. Highway 76/378 travels west from the city of Sumter it descends into the floodplain, although its construction has elevated it approximately 15 to 20 feet above the adjacent Gum Swamp and Wateree River.

Figure 3-1 Typical Views Along the Potential Routes



3.2 BIOLOGICAL RESOURCES

3.2.1 Definition of the Resource

Biological resources include plants and animals within the region and the habitats in which they occur. All organisms and habitats occurring in one location comprise the ecosystem. Complex plant associations are manifested as distinct vegetation communities, which are driven by characteristics of precipitation, soil, hydrology, aspect, elevation, and climate, as well as competition among plant species and herbivory. Wildlife associations are driven by plant species composition and structure of the vegetation community and abiotic factors such as soil structure, topographic relief, water availability, and temperature.

The ROI for biological resources is a 50-foot corridor on either side of the proposed force main and pump station. The ROI occurs within the Gulf-Atlantic Rolling Plain physiographic zone (Dahl 1999) within the Wateree watershed (HUC# 03050104-030). Land uses and land cover found within the Wateree watershed are: 49.5 percent forested land, 20.0 percent forested wetland (swamp), 13.5 percent agricultural land, 9.9 percent scrub/shrub land, 3.5 percent urban land, 3.1 percent water, 0.4 percent non-forested wetland (marsh), and 0.1 percent barren land (SCDHEC 2003). Within the ROI, the primary environmental features include the Wateree River, Beech Creek, and the Gum Swamp. Gum Swamp is a large wetland complex that contains several oxbow lakes including Ruggs Lake, Big Lake, Little Lake, and Dry Swamp Lake (SCDHEC 2003). Elevations within the ROI range from approximately 105 feet above mean sea level (MSL) near the Wateree River to approximately 120 feet above MSL at the lift station.

For purposes of this environmental assessment, biological resources are presented in four categories: 1) wetlands and other waters of the U.S., 2) upland vegetation, 3) wildlife and aquatic life, and 4) threatened and endangered species and species of concern. Biological resources found within the ROI are described based on available literature of the area, available mapping and aerial photography, interviews with local resource personnel, and a site visit by a project biologist in April 2004. No new biological surveys were conducted for this revised EA. Common and scientific names of plant and animal species discussed are included in Appendix B.

3.2.2 Wetlands and Other Waters of the United States

The primary legislation requiring federal agencies to consider wetland resources are Section 404 of the CWA, EO 11900, *Protection of Wetlands*, and EO 19988, *Floodplain Management*. Through their administration of Section 404 of the CWA, the USACE has jurisdiction over all waters of the U.S., of which wetlands are one type, and rivers and streams, such as the Wateree River and Beech Creek, are another.

Wetlands are transitional zones between terrestrial and aquatic habitats. As described in the 1987 *Corps of Engineers Wetlands Delineation Manual* (1987 Manual; Environmental Laboratory 1987), wetlands are those areas that are inundated or saturated by surface or ground water at a

frequency and duration sufficient to support (under normal circumstances) a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (Environmental Laboratory 1987). Wetlands provide important functions to wildlife and humans, including: dynamic water storage, flood flow attenuation, nutrient and pollutant removal/transformation, recreation (e.g., birding, hunting), and wildlife habitat. Wetlands are determined to be present at a location by the simultaneous occurrence of three criteria: occurrence of at least 50 percent hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (Environmental Laboratory 1987).

A site is generally considered to exhibit wetland hydrology if soil saturation occurs continuously for a minimum of five percent of the growing season (Environmental Laboratory 1987). The growing season within the ROI is from March 11 to November 13 (248 days) (NRCS 2003), making a minimum of 12.4 consecutive days of soil saturation necessary to meet wetland hydrology requirements.

Dominant soils found within the ROI include the Chewacla and Congaree series. Other soil series include Lenoir, Norfolk, and Vaucluse (SCDNR 2003). The Chewacla series is considered a hydric soil by the NRCS, though some phases of this soil may not be frequently flooded for long duration (NRCS 1995). In general, all soils found within the ROI can be described as loams to fine loams. The Chewacla and the Congaree soil series are deep to very deep, moderately permeable soils on fluvial sediments, such as floodplains (NRCS n.d.). The Lenoir, Norfolk, and Vaucluse soils are generally considered upland soils of the Coastal Plains (NRCS n.d.).

Wetlands comprise more than half of the ROI. Indeed, the majority of the ROI is composed of the Gum Swamp, located in the floodplain adjacent to the Wateree River. National Wetland Inventory (NWI) maps of the area, completed in 1989, were reviewed and indicate that riverine, lacustrine, and non-tidal palustrine wetland types occur within the ROI and surrounding landscape (SCDHEC 2003). Carolina bays and pocosins are common in Sumter County and may also occur within the ROI. Riverine wetlands occur within the banks of the Wateree River. The lacustrine wetland type occurs at the manmade Mikell's Pond located in the eastern portion of the project area, west of the junction of Claremont Road and Old Garners Ferry Road.

Palustrine wetland types identified by the NWI within the ROI include palustrine forested, palustrine scrub/shrub, and palustrine persistent emergent wetlands (SCDHEC 2003). Palustrine types are either flooded seasonally or remain flooded on a semi-permanent basis. The palustrine forested and scrub/shrub types are the most prevalent within the ROI. Palustrine forested wetlands are primarily dominated by broad-leaved deciduous trees and are considered bottomland hardwood wetlands (personal communication, Holmes 2003). They contain a diverse mixture of tree species such as: sweet gum, black gum, water tupelo, loblolly pine, cypress, hackberry, elm, sycamore, swamp white oak, swamp chestnut oak, willow oak, water oak, southern red oak, and laurel oak (personal communication, Holmes 2003).

Palustrine scrub/shrub wetlands are typified by woody vegetation that have multiple stems and generally are not greater than 20 feet in height (Cowardin et al. 1979). Scrub/shrub

wetlands found within the ROI are broad-leaved deciduous (SCDHEC 2003). Common shrub species likely include black willow, holly, viburnum, and Chinese privet (personal communication, Holmes 2003).

Palustrine emergent wetlands are dominated by non-woody vegetation, such as forbs, sedges, and grasses. NWI maps indicate that palustrine emergent wetlands are found only at the western edge of the project area, on the north side of U.S. Highway 76/378. However, smaller pockets of emergent wetlands may not be represented on NMI maps and may be found in low-lying areas, such as ditches, swales, and depressions found along the U.S. Highway 76/378 transportation corridor and Claremont and Old Garners Ferry Roads. Wetland vegetation likely found in the ROI includes: trumpet creeper, summer grape, sedges, rushes, and flatsedges (personal communication, Holmes 2003).

3.2.3 Upland Vegetation

Vegetation types found within the ROI have generally been disturbed in the past by agricultural practices (Air Force 2003) or more recently by road and highway construction. Much of the western portion of the project area is dominated by forested and scrub/shrub wetland types. Based on NWI mapping of the area, the upland vegetation types found within the ROI include cropland/pasture, pine plantations, broad-leaved deciduous forest, and disturbed areas (SCDHEC 2003).

Table 3.2-1 provides the relative extent of the various upland vegetation types. Disturbed areas within the ROI occur immediately adjacent to primary and secondary highways and are regularly mowed or otherwise maintained. Disturbed areas are likely dominated by bahiagrass (personal communication, Holmes 2003).

Table 3.2-1. Relative Percentages of Upland Vegetation Types Found within the ROI

Upland Vegetation Type	*Estimated Percent of ROI*[1]	*Comments*
Cropland/pasture	0.03	Found at the proposed pump station and along Claremont Road, however, croplands/pasture are west of the road right-of-way and ROI, and north of Old Garners Ferry Road, between Mikell's Pond and Claremont Road.
Pine Plantation	45	Found north of Old Garners Ferry Road, between Mikell's Pond and U.S. Highway 76/378.
Broad-leaved Deciduous Forest	30	Occurs as inclusions within the wetland areas found within the Gum Swamp.
Disturbed	25	Occur within road rights-of-way between the edge of pavement and cropland/pasture areas found along Claremont Road and Old Garners Ferry Road.

Note: 1. Percent cover estimates provide a relative comparison of upland vegetation types occurring within the ROI.

3.2.4 Wildlife and Aquatic Life

Wildlife is birds, mammals, reptiles, and amphibians that inhabit the ROI. Aquatic life is vertebrate (i.e., fish) and invertebrate animal species that spend the majority of their life spans in the water. The diversity and abundance of wildlife is dependent, in part, on the quantity, quality, and juxtaposition of existing habitat. Wetland, upland, and aquatic habitat types are found in the ROI. Aquatic habitat consists primarily of the Wateree River and Beech Creek and associated streams. This section includes a general description of the different wildlife groups in the ROI including aquatic life. Threatened and endangered species and species of concern are addressed in Section 3.2.5.

3.2.4.1 BIRDS

The diverse habitats in the ROI potentially support a variety of bird species including hawks, waterfowl, robins, sparrows, warblers, jays and crows. Game species may include northern bobwhite, mourning dove, American woodcock, common snipe, wild turkey, and various species of ducks. Raptors (i.e., birds of prey) occur in the ROI seasonally or as residents. Common year-round residents may include red-tailed hawk, red-shouldered hawk, broad-winged hawk, and barred owl. Sharp-shinned hawk and northern harrier may occur during winter (Peterson 1980).

Wetlands and swamps are rich with bird life. Nesting colonies of egrets and herons have been documented in areas adjacent to the ROI (SCHT 2002). Common wetland species include red-winged blackbirds, common yellowthroat, and yellow-breasted chat. Belted kingfishers may be found foraging along the edges of waterways. Swamp forests also provide wintering habitat for mallards, black ducks and other migratory waterfowl (personal communication, Stokes 2003).

Numerous species of songbirds could potentially be found in and around the ROI. Many species may use disturbed roadsides and edges, such as blue jay, American robin, brown-headed cowbird, northern cardinal, eastern kingbird, common grackle, and great-crested flycatcher (Peterson 1980). Turkey vultures and black vultures may be observed feeding on carrion on the roadsides. Species that may occur in the surrounding forests include red-eyed vireo, pine warbler, blue grosbeak, Carolina chickadee, and tufted titmouse.

3.2.4.2 MAMMALS

Large mammals that may occur in the ROI include white-tailed deer, gray fox, coyote, and bobcat. Mink, river otter, beaver, and muskrat could occur along streams. Habitat generalists, such as raccoon and opossum, are likely present. Other mammals found in the ROI may include eastern cottontail, hispid cotton rat, cotton mouse, southern shorttail shrew, southeastern shrew, and long-tailed weasel. Star-nosed mole, eastern mole, eastern harvest mouse, and meadow vole may inhabit moist areas. Within the forested habitat of the ROI, gray squirrel, southern flying squirrel, and eastern chipmunk may occur (American Society of Mammalogists 2002, Burt and Grossenheider 1980). Several species are managed and hunted as

game and fur-bearing animals (e.g., white-tailed deer, muskrat, opossum, raccoon, beaver, cottontail, and gray squirrel). In 2001, the estimated deer harvest in Sumter County was 5,065 (Ruth n.d.).

3.2.4.3 REPTILES AND AMPHIBIANS

A variety of reptiles and amphibians are expected to occur within the ROI. Lizard species that may occur include green anole, southern fence lizard, ground skink, and six-lined racerunner. A variety of snakes may be found in the ROI such as common garter, eastern ribbon, southern ringneck, hognose, rough green, and eastern mud. Other snakes may include eastern kingsnake, eastern cottonmouth, southern copperhead, and timber rattlesnake. Turtles would include eastern mud turtle, spotted turtle, common snapping turtle, eastern box turtle, and eastern painted turtle. Amphibians likely to occur in the ROI are the eastern tiger salamander, spring peeper, bullfrog, and bronze frog.

3.2.4.4 AQUATIC LIFE

Aquatic resources in the ROI include vertebrate and invertebrate populations. For the purposes of this assessment, fish will be the focus of aquatic resources in the ROI. Within the Wateree River, Beech Creek, and streams in the ROI, a variety of freshwater fish may occur. Species may include black crappie, redfin pickerel, spotted sucker, bluegill, bowfin, channel catfish, American eel, sawcheek darter, striped bass, gizzard shad, flier, and redbreast sunfish.

3.2.5 Threatened and Endangered Species and Species of Concern

This section includes a discussion of those species listed or proposed as threatened or endangered, or are candidates for listing in accordance with the federal ESA, as well as those species identified as species of concern by the USFWS. Candidate species are those that USFWS is considering for listing as threatened or endangered but for which a proposed rule has not yet been developed. Species of concern are former Category 2 candidate species for which data were inconclusive to support ESA protection at the time listing was proposed. It is an informal designation, although USFWS recommends tracking of population trends and threats. The state of South Carolina also maintains lists of protected species and species of concern.

The USFWS identified four endangered species with the potential to occur in the ROI: red-cockaded woodpecker, shortnose sturgeon, Canby's dropwort, and chaffseed (USFWS 2003). One threatened species, the bald eagle, may also occur in the ROI. Critical habitat has not been designated within the ROI for any federally listed species occurring in Sumter County. Currently, there are no species proposed for listing or candidate species identified for Sumter County (USFWS 2003). USFWS also identified several species of concern (USFWS 2003). Table 3.2-2 identifies species in Sumter County that are protected by the ESA, USFWS species of concern, and state-listed threatened, endangered, and species of concern (SCDNR 2003).

Table 3.2-2. Threatened and Endangered Species and Species of Concern

Common Name	*Scientific Name*	*Status*[1]	*Potential Occurrence*[2]
Mammals			
Black bear	*Ursus americanus*	SSC	Yes
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	SE	Possible
Birds			
American kestrel	*Falco sparverius*	FSC	Possible
Bachman's sparrow	*Aimophila aestivalis*	FSC	Yes
Bald eagle	*Haliaeetus leucocephalus*	T, SE	Yes
Henslow's sparrow	*Ammodramus henslowii*	FSC	Yes
Loggerhead shrike	*Lanius ludovicianus*	FSC	Possible
Least tern	*Sterna antillarum*	ST	Not likely
Mississippi kite	*Ictinia mississippiensis*	SSC	Possible
Painted bunting	*Passerina ciris ciris*	FSC	Possible
Red-cockaded woodpecker	*Picoides borealis*	E, SE	Yes
Reptiles and Amphibians			
Eastern coral snake	*Micrurus fulvius fulvius*	SSC	Possible
Northern cricket frog	*Acris crepitans crepitans*	SSC	Possible
Southern dusky salamander	*Desmognathus auriculatus*	FSC	Possible
Fish			
Broadtail madtom	*Noturus sp 2*	FSC	Possible
Shortnose sturgeon	*Acipenser brevirostrum*	E	Yes
Plants			
Awnpetal meadowbeauty	*Rhexia aristosa*	FSC	Yes
Baldwin's nutrush	*Scleria baldwinii*	SSC	Possible
Biltmore's carrionflower	*Smilax biltmoreana*	FSC	Yes
Boykin's lobelia	*Lobelia boykinii*	FSC	Yes
Canby's dropwort	*Oxypolis canbyi*	E, SE	Yes
Chaffseed	*Schwalbea americana*	E, SE	Yes
Cypressknee sedge	*Carex decomposita*	SSC	Possible
Dwarf burhead	*Echinodorus parvulus*	FSC	Yes
Leatherleaf	*Chamaedaphne calyculata*	SSC	Possible
Le Conte's flatsedge	*Cyperus lecontei*	SSC	Possible
Leechbrush	*Nestronia umbellula*	SSC	Not likely
Longbeak beaksedge	*Rhynchospora scirpoides*	SSC	Possible
Mohr's thoroughwort	*Eupatorium mohrii*	SSC	Not likely
A petunia	*Reullia caroliniensis ssp ciliosa*	SSC	Not likely
Piedmont threeawn	*Aristida condensata*	SSC	Possible
Pineland plaintain	*Plantago sparsiflora*	FSC	Yes
Robbin's spikerush	*Eleocharis robbinsii*	SSC	Possible
Quillwort arrowhead	*Sagittaria isoetiformis*	SSC	Possible
West Indian meadowbeauty	*Rhexia cubensis*	SSC	Possible

1. T = Listed as threatened in accordance with the Act; E = Listed as endangered in accordance with the Act; FSC = Federal species of concern; SE = State endangered; ST = State threatened; SSC = State species of concern.
2. Potential Occurrence: Yes = USFWS lists as occurring in Sumter County; Possible = Habitat requirements occur in the ROI and/or documented occurrences near ROI; Not likely = Habitat requirements may not occur in the ROI
Sources: USFWS 2003, SCDNR 2003, PLANTS 2004.

3.2.5.1 WILDLIFE AND FISH

Red-cockaded woodpeckers are known to occur near the ROI, although listed critical habitat has not been identified within the ROI. The red-cockaded woodpecker typically inhabits open, mature pine woodlands. Suitable long leaf pines for nesting are 70 to 100 years old. Potential red-cockaded woodpecker habitat is pine and pine-hardwood stands more than 60 years old; pine stands less than 60 years old with scattered or old-growth trees more than 60 years old; stands containing saw timber; and hardwood-pine stands more than 60 years old with adjacent pine and pine-hardwood stands more than 30 years old (Henry 1989). Red-cockaded woodpeckers will use areas with pines older than 30 years for foraging (Shaw AFB 2002). Although no red-cockaded woodpeckers are documented in the ROI, red-cockaded woodpeckers may occasionally use the ROI for foraging.

Bald eagle nests have been documented in the area, although no nests or perches have been documented in the ROI. Typically bald eagles are found close to rivers, where they feed mainly on fish. Within the ROI, they are likely only to be found near the Wateree River. However, they may use other areas in the ROI for foraging and may scavenge both aquatic and terrestrial prey, including road-killed animals.

Shortnose sturgeon occurs in riverine and estuarine habitat. Known populations inhabit rivers that drain into Lake Marion, of which the Wateree River is one. Spawning begins in February and extends through April, with sturgeon utilizing gravel and rubble river bottoms (SCDNR 2002a). No known populations of sturgeon occur in or near the ROI. However, suitable habitat may exist within the Wateree River (SCHT 2002).

Of the federal species of concern, only two—Bachman's sparrow and Henslow's sparrow—are known to occur in the ROI. Both sparrows are most likely to be observed in the ROI during winter. The Bachman's sparrow uses open, dry pine forests and scrub palmetto, while Henslow's sparrow prefers wet, shrubby fields and the understory of pine woods. The least tern, a state threatened species, was recorded breeding at Shaw AFB in 2001, the furthest inland breeding record for South Carolina (Shaw AFB 2002). However, least terns typically nest on coastal beaches, and this was considered a rare event.

3.2.5.2 PLANTS

The endangered Canby's dropwort is found in a variety of habitats including cypress savannahs, cypress-pine swamps, and wet pine savannahs (NatureServe 2002). The largest known populations occur in bays and ponds with little or no canopy cover and that are flooded throughout the year. This species is considered a near-endemic within Carolina Bays (Nelson 1992).

The endangered chaffseed occurs in open pine flatwoods, lowland forests, fire-maintained savannahs, and other grass/sedge dominated communities. It is intolerant of shade. Chaffseed, therefore, sometimes occurs in disturbed roadsides at the edges of woods (Nelson

1992). It is a hemiparasitic plant that attaches to the roots of various tree species from which it obtains nutrients.

The following federal species of concern were identified by USFWS as occurring in Sumter County: dwarf burhead, awnpetal meadowbeauty, Boykin's lobelia, Biltmore's carrionflower, and pineland plantain. Dwarf burhead has recently been documented within Sumter County (SCHT 2002). Specimens were found at the edge of a circular depression in damp, peaty sand and in a roadbed next to a temporary wetland in pinewoods. Awnpetal meadowbeauty can be found in areas with grass-sedge dominated Carolina bays, wet pinelands, pond-cypress savannahs and vernal ponds (NatureServe 2002). Boykin's lobelia is dependent on fluctuating water levels and may inhabit wet pine savannahs, flatwoods, and cypress ponds (Nelson 1992). Biltmore's carrionflower can be found in drier forests, while pineland plantain is a wetland obligate.

3.3 CULTURAL RESOURCES

3.3.1 Definition of the Resource

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious or other purposes. They include archaeological resources (both prehistoric and historic), historic architectural resources, and traditional resources. Significant cultural resources (as defined in 36 CFR 60.4) are considered for potential adverse impacts from an action. Significant archaeological and architectural resources are either eligible for listing, or listed on, the National Register of Historic Places (NRHP). Significant traditional resources are identified by Native American tribes or other groups, and may also be eligible for the NRHP.

On 21 November 1999, the Department of Defense (DoD) promulgated its American Indian and Alaska Native Policy, which emphasize the importance of respecting and consulting with tribal governments on a government-to-government basis. The Policy requires an assessment, through consultation, of the affect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the services.

The ROI for cultural resources is the area within which the proposed action or alternatives have the potential to affect existing or potentially occurring cultural resources, in this case, the route(s) of the proposed force main.

3.3.2 Existing Conditions

3.3.2.1 HISTORICAL SETTING

Human occupation of the project region dates back at least 14,000 years when small groups of hunters ranged widely throughout the region. As the climate warmed, people began using a

wide range of plant and animal resources over smaller territorial ranges (Shaw AFB 2001a). Population increased and eventually agriculture developed, providing the basis for village life. As agricultural use intensified, towns with public and sacred places and platform mound ceremonialism emerged in the region. Spanish exploration of the region began in early 1500s, leading to the establishment of a town near present-day Camden (Shaw AFB 2001a). England formed a government for the Carolina colonies in the late 1600s with settlement centering in the Charleston area. In 1701, four Indian groups were identified in central South Carolina: the Wateree (Sumter County); the Congaree (to the west); the Santee (to the south); and the Catawba (to the north) (Shaw AFB 2001a). These groups were loosely associated as the Esaw Confederation and fought the English settlers on the coast in the Yamasee War. Following the defeat of the Esaw Confederation, the site of the present-day Shaw AFB area was vacated except for occasional hunting use (Shaw AFB 2001a).

Regular contact between Euroamericans and Cherokees in the region began with the founding of the Carolina colonies (Sultzman 1996). A 1684 treaty with South Carolina initiated trade in deerskins and Indian slaves, and Cherokee warriors became hunters for profit (Sultzman 1996). European trade and competition aggravated rivalries among native groups, and friction increased between the Cherokee and surrounding native groups including the Catawba. British interests in the region supported a series of peace efforts culminating in a 1743 treaty between the Cherokee and Catawba (Sultzman 1996). Conflicts with the British eventually resulted in the Cherokee War of 1760 to 1762. After their defeat, the Cherokee signed a treaty with the South Carolina that ceded most of their eastern lands in the Carolinas. In 1838, the U.S. government forcibly removed many of the Cherokee from their lands. The U.S. formally recognized the Eastern Cherokee, living in the mountains of western North Carolina, in 1848 (Sultzman 1996). The Qualla Boundary reservation was chartered in 1889.

Euroamerican settlers moved into Sumter County, beginning in the mid-1700s, to raise cattle and indigo. An influx of small farmers during the Great Overland Migration of the 1750s and 1760s fully settled the colony. During the Revolutionary War, the Camden area was a British stronghold and skirmishes were fought throughout the countryside. After the war, when the indigo market collapsed, cotton became the crop of choice and African slaves soon outnumbered free men. Large plantations were established throughout the region. Across the Wateree River from the project area was the Goodwill Plantation, developed in 1795, where nearly 1,000 slaves resided (South Carolina Department of Archives and History [SCDAH] 2000). Civil War action took place largely outside the region until near the end of the war when "Potter's Raid" attacked local railroads. After the Civil War, large plantations were replaced by smaller farms and logging operations.

Much of southwestern Sumter County, including present-day Poinsett ECR, was set-aside as state park and Federal forest in the 1930s. Shaw Field was established as an Army air base in 1941 in an area that had been primarily agricultural fields. Shaw AFB acquired Poinsett ECR in 1951 and Wateree Recreation Area in 1959 (Shaw AFB 2001a).

3.3.2.2 IDENTIFIED CULTURAL RESOURCES

There are no NRHP-listed cultural resources within the project area. Archaeological surveys in Sumter and Richland counties, from the 1970s to the present, have identified a range of cultural resources (SCDAH 2003), many of which are considered eligible for the NRHP. A review of SHPO records for an area within two miles of the proposed project identified eight cultural resources, all in Richland County (EDR 2002). Table 3.3-1 identifies NRHP-listed properties within 2 miles of the project area. All of these resources are across the Wateree River from the project area.

Table 3.3-1. NRHP Listed Properties Near the Project Area

Resource Name	*Resource Type*	*Nearest Town*
Goodwill Plantation 1	Historic Structure	Eastover, SC
Goodwill Plantation 2	Historic Structure	Eastover, SC
Goodwill Plantation 3	Historic Structure	Eastover, SC
Farmers and Merchants Bank Building	Historic Structure	Eastover, Sc
Good Hope Baptist Church	Historic Structure	Eastover, SC
J.A. Byrd Mercantile Store	Historic Structure	Eastover, SC
Kensington Plantation House	Historic Structure	Eastover, SC
Laurelwood	Historic Structure	Eastover, SC

Source: EDR 2002

The federally recognized tribe nearest to the project area is the Catawba Indian Nation, near Rock Hill, South Carolina.

3.4 WATER RESOURCES

3.4.1 Definition of the Resource

Water resources include surface and groundwater features, as well as watershed areas affected by existing wastewater from the base, including floodplains. Water supply to the base is addressed in section 3.7. The ROI is defined as the hydrologic basins in which the proposed project components are located.

3.4.2 Existing Conditions

SURFACE WATER

The Wateree River watershed (SCDEHC hydrologic unit #03050104-030) encompasses 223,982 acres within Kershaw, Sumter and Richland counties. The watershed consists primarily of the Wateree River from the Wateree dam to its confluence with the Congaree River, Swift Creek (03050104-080) and Colonels Creek (03050104-100) (Figure 3-2). There is a SCDHEC ambient

Figure 3-2. Wateree River, Swift Creek, and Colonels Creek Watersheds

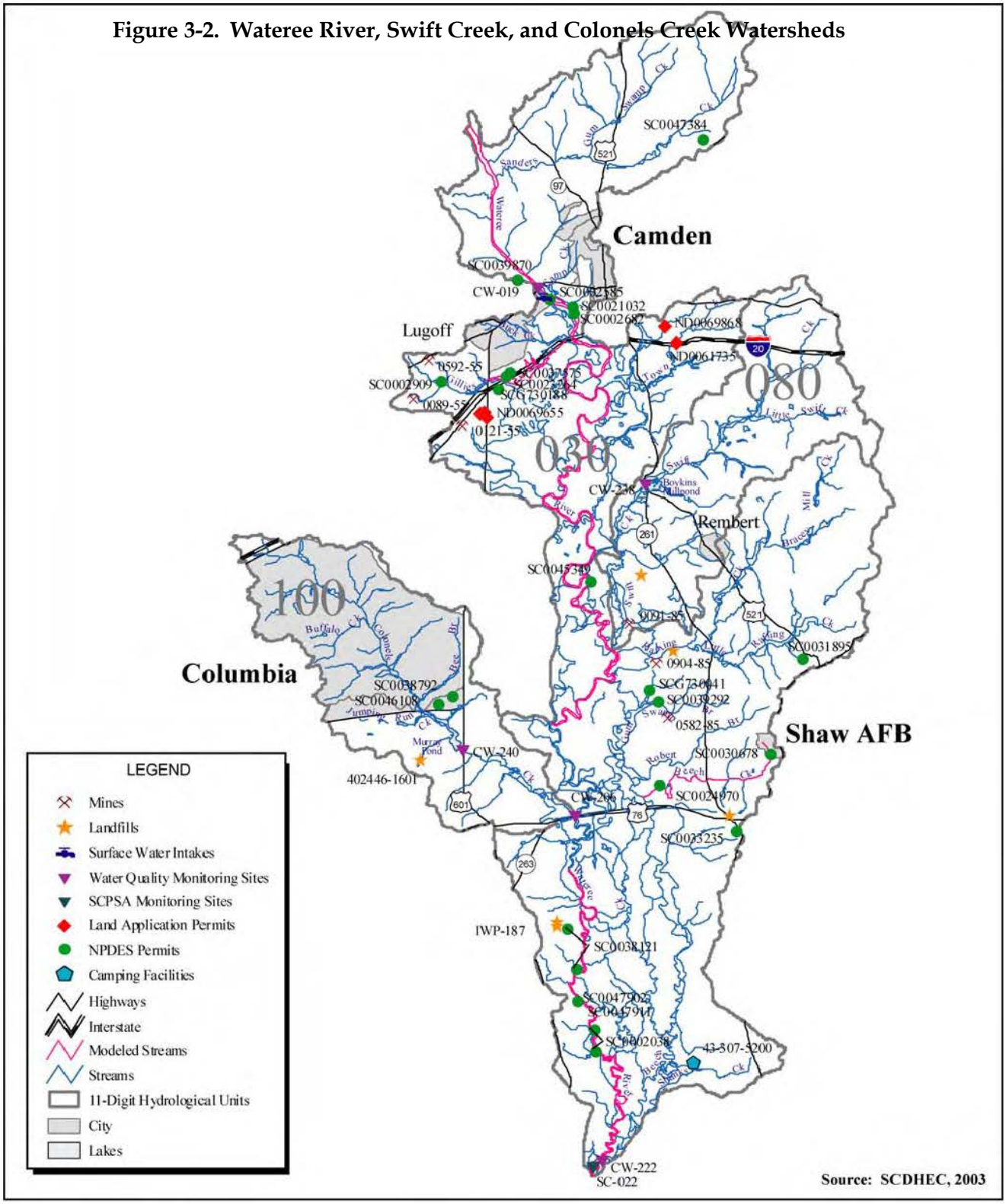


Figure 3-2

Wateree River, Swift Creek, and Colonels Creek Watersheds (03050104-030-080-100)

monitoring station site (CW-206) on the Wateree River within the project area as it flows beneath U.S. Highway 76/378. This station is sampled on a monthly basis year round and the flow rate varies from less than 1,000 cubic feet per second (cfs) to over 17,000 cfs (USGS 2003). Water quality at this location is rated as Class FW (freshwaters), is suitable for primary and secondary contact recreation and as a source of drinking water after conventional treatment.

Beech Creek flows from just west of Shaw AFB through Gum Swamp to the Wateree River, and is the current discharge point for the gravity sewer line from Shaw AFB. The photo on the right shows the discharge point. The drainage basin for the creek upstream of the Base's treated wastewater discharge includes approximately 9 square miles of agricultural and residential lands. A search of USEPA's STORET water quality data files did not find any recent water quality or flow rate data for Beech Creek in the project vicinity (USEPA 2004). Beech Creek has been assigned a 7Q10 of zero by The Waste Load Allocation Section of SCDHEC, which means that the creek is essentially dry at certain times during the year. Flow was observed throughout the years 2002, 2003 and 2004 as shown in the photograph below at the Claremont Road bridge (under construction in 2003).

The designation, 7Q10 rating, is the average low flow seven-day discharge that occurs once every 10 years. This area is in the coastal plains segment of South Carolina, which helps determine the 7Q10 for streams with no monitoring. The type of soils and topography in coastal plains are information used to extrapolate a 7Q10.

Generally, all of the tributary streams in Gum Swamp have been assigned a 7Q10 of zero (Greenhorne & O'Mara, 1998).

The current base wastewater discharge, SC0024970, is classified as minor industrial discharge, with a permitted flow of 1.2 mgd. The average wastewater flow ranges from 0.7 to 0.8 mgd (Air Force 2002). The copper discharge limit (monthly average) for Beech Creek will be 9.7 µg/l as of 1 January 2006. The limit for Wateree River is 330 µg/l (Air Force 2002).

According to Federal Emergency Management Agency (FEMA) maps (FEMA 1989) much of the project area is located within the 100-year floodplain of the Wateree River. Where U.S. Highway 76/378 crosses Wateree River, the floodplain is over four miles wide. Also included in the 100-year floodplain is an area approximately 100 feet wide along Claremont Road at Beech Creek.

GROUNDWATER

There are three aquifer systems in the project area. They consist of the Middendorf Aquifer, Black Creek Aquifer, and the shallow aquifer system, which includes the Lang Syne Formation and the Duplin Formation.

The Middendorf (Tuscaloosa) Aquifer is the most productive of the aquifer systems in the western portion of Sumter County. The aquifer is approximately 250 feet thick and is encountered at about –50 feet below mean sea level in the Shaw AFB area. The Middendorf Aquifer is confined by a 15 to 75-foot thick clay layer located at the base of the Black Creek Formation. Although none of the Shaw AFB wells are screened within the Middendorf Aquifer, Wells 6 and 7 were initially drilled to depths that concur with the reported depths of the upper portion of the Middendorf Formation (Rust Environment & Infrastructure, Inc. 1997).

The six water supply wells currently operating at Shaw AFB are screened in the Black Creek Aquifer. The Black Creek Aquifer is separated into upper and lower portions by a confining layer. The upper aquifer is approximately 50 to 70 feet thick while the lower aquifer ranges from 75 to 105 feet thick. Wells completed in the Black Creek Aquifer are capable of yielding up to 750 gallons per minute (gpm) (Rust Environment & Infrastructure, Inc. 1997).

The Lang Syne Formation of the Black Mingo Group and the Duplin Formation make up the shallow aquifer system in the Shaw AFB area. The Lang Syne Aquifer is located in the northwestern portion of Shaw AFB, northwest of the Orangeburg Scarp, while the Duplin Aquifer is present southeast of the scarp. The two aquifers are not hydraulically connected due to the presence of the fine-grained Sawdust Landing Formation, considered an aquitard, underneath the Lang Syne Aquifer (Air Force 2001).

3.5 EARTH RESOURCES

3.5.1 Definition of the Resource

Earth resources are the natural geologic features that characterize a setting as well as the physical elements that make up that setting. The physiography, geology, and soils of an area are used to characterize the features and setting of earth resources. The ROI for earth resources is the corridor approximately 50 feet on either side of the proposed force main routes.

3.5.2 Existing Conditions

The proposed sewer outfall routes are within the Atlantic Coast Plain physiographic province. The geologic formations of the Coastal Plain in this area consist of Cretaceous and Tertiary sediments that lie above crystalline basement rocks. These sediments are reported to be approximately 700 feet thick and are comprised of a series of unconsolidated clay, silt, sand, and gravel layers. Surface soils are composed mainly of sandy loams and sands that are moderate to excessively well drained (Air Force 2001). Information on the local geology and soils is provided in Tables 3.5-1 and 3.5-2, respectively. Additional soils information obtained from the National Resources Conservation Service indicated that soils in the immediate vicinity of the US 76/378 crossing of the Wateree River were not hydric (NRCS 2004).

Table 3.5-1. Summary of Geological Information
Proposed Extension of Force Main Routes, Sumter County, South Carolina

Rock Stratigraphic Unit	
Era	Mesozoic
System	Cretaceous
Series	Woodbine and Tuscaloosa Groups
Code	uK1
Geologic Age Identification	
Category	Stratified Sequence
Dominant Soil Composition in General Area	
Soil Component Name	Chastain
Soil Surface Texture	Silty clay loam
Hydrologic Group	Class D – Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class	Poorly. Soils may have a saturated zone, a layer of low hydraulic conductivity, or seepage. Depth to water table is less than 1 foot.
Hydric Status	Soil meets the requirements for a hydric soil.
Corrosion Potential – Uncoated Steel	High
Depth to Bedrock Minimum	>60 inches

Source: EDR. 2002

Table 3.5-2. Summary of Soils Information
Proposed Force Main Routes, Sumter County, South Carolina

Layer	BOUNDARY		*Soil Texture Class*	CLASSIFICATION		*Permeability Rate (in/hr)*	*Soil Reaction (pH)*
	Upper	*Lower*		*AASHTO Group*	*Unified Soil*		
1	0 inches	5 inches	Silty clay loam	Silt-Clay Materials (more than 35 percent passing No. 200), Silty Soils	Fine-grained soils, Silts and Clays (liquid limit less than 50 percent), silt	Max: 0.60 Min: 0.20	Max: 6.00 Min: 4.50
2	5 inches	52 inches	Silty clay loam	Silt-Clay Materials (more than 35 percent passing No. 200), Silty Soils	Fine-grained soils, Silts and Clays (liquid limit less than 50 percent), silt	Max: 0.20 Min: 0.06	Max: 6.00 Min: 4.50
3	52 inches	72 inches	Loamy sand	Granular materials (35 percent or less passing No. 200), Silty, or Clayey Gravel and Sand	Course-grained soils, Sands, Clean Sands, Poorly graded sand	Max: 20.00 Min: 6.00	Max: 6.00 Min: 4.50

Source: EDR. 2002

3.6 AIR QUALITY

3.6.1 Definition of the Resource

This section discusses air quality considerations and conditions in Sumter County and at Shaw AFB, South Carolina. It addresses air quality standards and describes current air quality conditions in the region.

Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the CAA, the United States Environmental Protection Agency (USEPA) has established nationwide air quality standards to protect public health and welfare, with an adequate margin of safety.

These federal standards, known as the National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations for six "criteria" pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter less than 10 micrometers in diameter (PM_{10}), ozone (O_3), and lead (Pb) (40 CFR 50). Recent amendments have added a standard for particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) that will be implemented over a period of time. Under the CAA, state and local agencies may establish ambient air quality standards and regulations of their own,

provided these are at least as stringent as the federal requirements. The standards adopted by South Carolina are shown in Table 3.6-1.

Table 3.6-1. Applicable Ambient Air Quality Standards

Air Pollutant	*Averaging Time*	FEDERAL		SOUTH CAROLINA
		Primary	*Secondary*	*Primary*
Carbon Monoxide (CO)	8-Hour 1-Hour	9 ppm 35 ppm	-- --	10 µg/m^3 40 µg/m^3
Nitrogen Dioxide (NO_2)	AAM 24-Hour	0.053 ppm --	0.053 ppm	100 µg/m^3 --
Sulfur Dioxide (SO_2)	AAM 24-Hour 3-Hour	0.03 ppm 0.14 ppm --	-- -- 0.5 ppm	80 µg/m^3 365 µg/m^3 1300 µg/m^3
Particulate Matter (PM_{10})	AAM 24-Hour	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3
Particulate Matter ($PM_{2.5}$)[1]	AAM 24-Hour	15 µg/m^3 65 µg/m^3	15 µg/m^3 65 µg/m^3	-- --
Total Suspended Particulates (TSP)	AGM 24-Hour	-- --	-- --	75 µg/m^3 --
Ozone (O_3)[2]	1-Hour 8-Hour	0.12 ppm 0.08 ppm	0.12 ppm --	0.12 ppm --
Lead (Pb) and Lead Compounds	Calendar Quarter	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3
Gaseous Fluorides (HF)	AAM 1 Month 1 Week 24-Hour 12-Hour	-- -- -- -- --	-- -- -- -- --	-- 0.8 µg/m^3 1.6 µg/m^3 2.9 µg/m^3 3.7 µg/m^3

Notes:
1. The $PM_{2.5}$ standard (particulate matter with a diameter equal to or less than 2.5 microns) was promulgated in 1997, and will be implemented over an extended time frame. Areas will not be designated as in attainment or nonattainment of the PM 2.5 standard until the 2002 – 2005 timeframe.
2. The 8-hour Ozone standard was promulgated in 1997, and may eventually replace the 1-hour standard. The U.S. Supreme Court has instructed the USEPA to develop a reasonable implementation of the 8-hour nonattainment provisions. During the interim, the 1-hour ozone standard will continue to apply.

AAM = Annual Arithmetic Mean
ppm = parts per million
µg/m^3 = micrograms per cubic meter
ppb = parts per billion
AGM = Annual Geometric Mean

Sources: USEPA 2002; South Carolina Ambient Air Quality Standards 1989;

The CAA of 1977 set provisions for the attainment and maintenance of the NAAQS. For non-attainment regions, the states are required to establish a State Implementation Plan (SIP) designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal to bring state air quality conditions into (and maintain) compliance with the

NAAQS by specific deadlines. Regional attainment plans are generally prepared by local agencies and incorporated into the overall SIP of the state.

CAA Section 176(c), General Conformity, established certain statutory requirements for federal agencies with proposed federal activities to demonstrate conformity of the proposed activities with the each state's SIP for attainment of the NAAQS. In 1993, the USEPA issued the final rules for determining air quality conformity (40 CFR Parts 51 et al. in Federal Register November 30, 1999). Federal activities must not:

- cause or contribute to any new violation of a NAAQS;
- increase the frequency or severity of any existing violation; or
- delay timely attainment of any standard, interim emission reductions, or milestones in conformity to a SIP's purpose of eliminating or reducing the severity and number of NAAQS violations or achieving attainment of NAAQS.

General conformity applies only to nonattainment and maintenance areas. If the emissions from a federal action proposed in a nonattainment or maintenance area exceed annual thresholds identified in the rule, a conformity determination is required of that action. The thresholds become more restrictive as the severity of the nonattainment status of the region increases.

Class III areas are those designated by the governor of a state as requiring less protection than Class II areas. No Class III areas have yet been so designated. The Prevention of Significant Deterioration (PSD) requirements affect construction of new major stationary sources in the PSD Class I, II, and III areas and are a pre-construction permitting system.

CAA Section 169A established the additional goal of prevention of visibility impairment in the PSD Class I areas. Visibility impairment is defined as a reduction in the visual range and atmospheric discoloration. Determination of the significance of an activity on visibility in a PSD Class I area is typically associated with evaluation of stationary source contributions. The USEPA is in the process of implementing a Regional Haze rule for PSD Class I areas that will address contributions from mobile sources and pollution transported from other states or regions.

The USEPA is presently initiating planning processes to implement the new 8-hour O_3 and 24-hour and annual $PM_{2.5}$ national standards (particulate matter less than 2.5 microns in diameter). The USEPA will finalize attainment status designations for the 8-hour O_3 standard by April 15, 2004 (USEPA 2002a). An area will attain this standard if its three-year running average of the annual fourth-highest daily maximum 8-hour O_3 concentration remains below 0.085 parts per million. The USEPA will not revoke implementation of the 1-hour O_3 standard in a given area until that area achieves this standard. Otherwise, as is the case for South Carolina, implementation of the 8-hour standard will replace the existing 1-hour standard. In South

Carolina, 18 of 23 O_3 monitors, particularly those in the more populated urban areas, regularly exceed the 8-hour O_3 standard (SCDHEC 2004). Upon final designation of these nonattainment areas, the SCDHEC will have to submit a plan to the USEPA that demonstrates how they will bring the areas into attainment of the 8-hour O_3 standard.

3.6.2 Existing Conditions

The USEPA designates areas of the U.S. as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment). Section 162 of the CAA established the goal of PSD of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have the authority to redesignate certain areas as (non-mandatory) PSD Class I areas, i.e., a National Park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres. PSD Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted.

The project area is located in Sumter County, South Carolina which is part of the Camden/Sumter Intrastate Air Quality Control Region (AQCR). Table 3.6-2 provides the most recent air emission inventory for the AQCR (year 1999). Information provided by the Bureau of Air Quality Control of the SCDHEC which has the authority to regulate air pollution sources in the state of South Carolina indicated that this county is considered in attainment for NO_2, SO_2, O_3, CO, and PM_{10}, and based on collected data is expected to be designated as attainment for the $PM_{2.5}$ and the 8-hour O_3 standards (SCDHEC 2001). A review of its federally published attainment status for South Carolina and discussions with the USEPA Region IV staff also verified the attainment status of Sumter County for these five criteria pollutants.

Table 3.6-2. Existing Camden/Sumter Intrastate AQCR Emissions

EXISTING POLLUTANTS (TONS PER YEAR)					
CO	***SO_2***	***NO_2***	***PM_{10}***	***Pb Compounds***	***VOC***
100,400	5,034	17,835	23,088	-----	23,385

Source: AIR Data2002.

3.7 INFRASTRUCTURE

3.7.1 Definition of the Resource

Infrastructure includes the utility systems that provide potable water and wastewater service to Shaw AFB. It also includes transportation and refers to the movement of vehicles on roadway

networks. Roadway operating conditions or the adequacy of the existing and future roadway system to accommodate these vehicular movements are described in terms of average daily traffic volumes and/or level of service (LOS) ratings. LOS ratings range from LOS A for free-flowing traffic conditions (average vehicle delay of 5 seconds or less) to LOS F for congested conditions (average vehicle delay of 60 seconds or more). For infrastructure resources, the ROI includes the potable water and wastewater systems that provide service to Shaw AFB and roadway networks in the project vicinity.

3.7.2 Existing Conditions

POTABLE WATER SYSTEM

The Shaw AFB water system is operated independently from other water systems located in the immediate region. Most of the base's water system was installed in the 1950s. The water system includes 34 miles of water mains divided into two pressure zones and six production wells as identified in Table 3.7-1. The base golf course also uses two wells for course irrigation. Ground water is treated for corrosion control and disinfected. In general, each well's raw water is treated with sodium hexametaphosphate, fluoride, soda ash, and chlorine. The chemicals and chemical metering equipment is identical from well to well.

Table 3.7-1. Production Capacities of Wells

Well	*Rated GPM*	*GPM Capacity*	*2001 Total Million Gallons/Year*[1]	*Remarks*
1	650	500	56.86	Capacity limited by PTA
4	600	490	103.36	Capacity limited by PTA
6	510	500	89.64	Currently producing about 400 GPM
3	600	500	58.03	Capacity limited by PTA
5	600	580	47.61	
7	510	450	64.92	

Note: 1.Shaw AFB Water Use Report 2001 submitted to SCDHEC Bureau of Water.
GPM= Gallons per minute
PTA = Packed Tower Aeration system installed to air sparge remove TCE

There are three elevated water storage tanks. Two are sized at 250,000 gallons and one contains 500,000 gallons. The housing area distribution system is at a higher elevation than the main base distribution system. Therefore, the distribution system is divided and operated as two pressure zones. The base water system has two interconnections with the High Hills Rural Water Company and one with the City of Sumter Water System. These interconnections are rarely used and are intended for emergencies.

WASTEWATER SYSTEM

The wastewater plant consists of preliminary, secondary, and tertiary treatment processes. The plant is operated by a contractor and has been upgraded to include flow equalization and lime addition. The typical plant flow rate averages between 0.7 and 0.8 mgd. Wastewater is initially pre-treated in an aerated grit chamber and temporarily stored in an aerated equalization tank. Secondary treatment is conducted in three extended activated sludge tanks. Clarifiers are used to remove suspended solids and the decant water is polished using multi-media filters. Effluent from the filters is disinfected and discharged from the facility after metering and sampling at outfall 001. Excess chlorine is oxidized with SO_2. Sludge from the clarifiers are thickened and treated in three aerobic digesters and stabilized with lime prior to disposal.

There are two lime systems at the plant; the one is used for sludge stabilization. The second lime system was installed approximately one year ago and is used to increase alkalinity concentrations to enhance the activated sludge process. The wastewater system discharges via a 24-inch gravity sewer line to a ditch that flows to Beech Creek.

TRANSPORTATION

U.S. Highway 76/378, which passes along the southern boundary of Shaw AFB, connects the City of Sumter with the City of Columbia, the capital of South Carolina. The roadway consists of a four-lane divided highway with a wide vegetated median and a right-of-way that varies between 400 to 550 feet. Within the project area, the road surface was constructed with a considerable amount of fill raising the road elevation approximately 15 to 20 feet above the surrounding swamp. The highway, maintained by SCDOT, had a two-way 24-hour traffic count of 15,300 vehicles in 2001 and operates in free-flow conditions (LOS A) (personal communication, Sheppard 2003).

Claremont Road and Claremont Lane are two-lane collector roads with a pavement width of 25 feet and a 66-foot right-of way maintained by SCDOT. Old Garners Ferry Road is also a two-lane road with a pavement width of approximately 22 feet and a right-of-way of 50 feet and Sumter County maintains it. A portion of the road is gravel-covered. All three roads experience low traffic volumes. Old Garners Ferry Road, generally travels east west, but turns south and intersects with U.S. Highway 76/378 in a t-intersection (Figure 2-1).

3.8 NOISE

3.8.1 Definition of the Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Human response to noise varies according to the type and characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day.

Sound is measured with instruments that record instantaneous sound levels in decibels (dB). A-weighted sound level measurements (often denoted dBA) are used to characterize sound levels that are heard especially well by the human ear. All sound levels analyzed in this revised EA are A-weighted; thus, the term dB implies dBA unless otherwise noted.

The ROI for this proposed action includes area adjacent to the force main routes considered under the proposed action and alternative.

3.8.2 Existing Conditions

The noise environment within western Sumter County is characteristic of rural environments with vehicular noise along highways and railways and by farm and forestry equipment in nearby fields. Ambient background noise typically varies from approximately 35 to 50 dBA. An exception to these conditions is the noise associated with aircraft activity at Shaw AFB. Noise levels from flight operations exceeding ambient background noise typically occur beneath main approach and departure corridors, under local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft take off and gain altitude, their contribution to the noise environment drops to levels indistinguishable from the background.

The area between Claremont Road and the Wateree River experiences an occasional overflight (at 1500-3000 feet above ground level [AGL]) of aircraft arriving or departing Shaw AFB. Within the project area there are two residences, both of which are more than 1,000 feet from Claremont Road. The area is located approximately 2.5 miles west of the 65-db Day-Night Average Sound Levels (DNL) noise contour at Shaw AFB (Air Force 1994) and aircraft noise contributes to the overall noise environment.

3.9 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.9.1 Definition of the Resource

The specific socioeconomic resource areas addressed include employment and earnings, population, housing, and environmental justice. The ROI comprises Sumter County, which encompasses Shaw AFB and the City of Sumter, South Carolina. Socioeconomic information is presented for the ROI and, where appropriate, comparisons are presented with conditions for the State of South Carolina. EO 12898, *Environmental Justice*, requires analysis of the potential for federal actions to cause disproportionate health and environmental impacts on minority and low-income populations.

3.9.2 Existing Conditions

EMPLOYMENT AND EARNINGS

In the ROI, total full- and part-time employment increased from 48,725 jobs in 1990 to 56,856 in 1999, at an average rate of 1.7 percent annually. The largest contributions to employment in 1999 were made by services (22.8 percent), manufacturing (22.0 percent), and government enterprises (21.7 percent). The sectors of the economy exhibiting the greatest relative increase in jobs over the period 1990-1999 were transportation and public utilities, services and manufacturing. For the years 1980, 1990, and 1999, the contribution of the military to total employment decreased from 13.5 percent to 12.9 percent and 9.7 percent, respectively (United States Department of Commerce, Economics, and Statistics Administration [USDCESA] 2000).

For the State of South Carolina, full- and part-time employment increased at an average rate of 1.9 percent annually between 1990 and 1999, at which time employment in the state was just more than two million jobs. The sectors of the economy contributing the greatest number of jobs in the state over this period were services, retail trade, and manufacturing.

Total earnings in the ROI totaled more than $1.4 billion in 1999. Industries contributing the most toward job earnings included government enterprises (32.2 percent), manufacturing (24.2 percent), services (17.5 percent), and retail trade (8.69.4 percent). In South Carolina, total earnings amounted to $63.7 billion in 1999. Average earnings per job in the ROI amount to $25,896 while per capita income is $18,238 (USDCESA 2000).

The number of military personnel stationed at Shaw AFB is approximately 5,412, with an additional 462 civilian workers. The value of payroll associated with government personnel at Shaw AFB reached over $150 million in 1999 (personal communication, Hallmark 2002).

Shaw AFB purchases significant quantities of goods and services from local and regional firms. In 1999, non-payroll annual expenditures by the base were more than $130 million. The Air Force estimates that the economic stimulus of Shaw AFB accounts for approximately one-third of the general economic activity in the ROI, contributing a total annual economic impact of approximately $500 million (personal communication, Hallmark 2002).

POPULATION

The population of the ROI increased by 3.3 percent between 1990 and 2000 to a population of 104,646 persons in 2000. This increase took place at an average annual rate of 0.3 percent. By comparison, the population of South Carolina increased by 15.1 percent during the same period, reaching 4,012,012 persons in 2000 with an average annual growth rate of 1.4 percent between 1990 and 2000 (United States Bureau of the Census 2000). The Shaw AFB population, including government personnel and their dependents, currently amounts to approximately 7,000 persons (personal communication, Hallmark 2002). The majority of off-base military personnel and their dependents reside in the City of Sumter, with a 2000 population of approximately 43,000

persons. Like all military installations, Shaw AFB experiences shifts in population based on mission changes, deployments, and other operational considerations.

ENVIRONMENTAL JUSTICE

Disadvantaged groups within the ROI, including low-income and minority communities, are specifically considered in order to assess the potential for disproportionate occurrence of impacts. Based on 2000 Census data, the incidence of persons and families in the ROI with incomes below the poverty level was comparable to state levels (U.S. Bureau of the Census 2000). In the ROI during 2000, 19.7 percent of adults and 26.9 percent of children were living below the poverty level, compared to 14.9 percent of persons and 23.0 percent of children in the state of South Carolina as a whole. It is likely that a number of the unaccompanied, lower-ranking enlisted personnel assigned to Shaw AFB are represented in the low-income population within the ROI.

Minority persons represent slightly more than half the ROI population (50.6 percent). Black or African Americans account for almost all of the minority population in the ROI, representing 46.7 percent of the county population of 104,646 persons (or 92 percent of the minority population). By comparison, 33.9 percent of the state population is represented by minority persons (U.S. Bureau of the Census 2000).

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4.0 ENVIRONMENTAL CONSEQUENCES

Chapter 4.0 presents the environmental consequences of the proposed force main construction for each of the resource areas discussed in Chapter 3.0. To define potential direct and indirect impacts, this chapter evaluates the project elements described in Chapter 2.0 against the affected environment provided in Chapter 3.0. Cumulative effects of the proposed action with other foreseeable future actions are presented in Chapter 5.0.

4.1 LAND USE, RECREATION, AND VISUAL RESOURCES

4.1.1 Proposed Action: U.S. Highway 76/378 Route

With the implementation of the proposed action, the proposed 12-inch force main would be constructed within the rights-of-way of Claremont Road, Old Garners Ferry Road and U.S. Highway 76/378. A road right-of-way is established when a road is planned and constructed to provide adequate space to maintain the road and for the placement of utilities, such as force mains. All three roads have adequate right-of-way to accommodate the placement of the force main. A temporary 50-foot construction easement would be obtained from Sumter County and SCDOT for the construction activity and a 15-foot permanent easement would be obtained for the maintenance of the force main. Access to adjacent land uses would not be permanently affected by the proposed action since only limited access points occur along the route and construction activity would be managed to allow passage for vehicles requiring access. Therefore, land use, patterns, and ownership within the ROI would not be adversely affected as a result of the proposed action.

Construction of the pump station (18 feet wide and 26 feet deep) at the preferred location would require a construction area approximately 70 feet by 140 feet with a permanently fenced clear area of approximately 54 feet by 100 feet. This area would be acquired by permanent easement on the east side of Claremont Road. A review of historic aerial photographs dating back to 1937 indicates that this area has been undeveloped. Although this represents a change in land use for this specific property, isolated structures are common in the area. Land ownership would not change since the U.S. Government would obtain a permanent easement for the 9,800-square foot area.

Pump station construction at the alternate location would require a permanent easement for the 25,800 square feet needed for the pump station and the access road from Claremont Lane. This area is currently used for agriculture and use of the land for a pump station is allowed as a public use in this zone by Sumter County. The proposed action is consistent with County plans and ordinances. Infrastructure improvements within the public right-of-way are anticipated to be temporary activities that do not result in long-term land use changes. County zoning will remain as agricultural conservation.

Recreational resources, such as the W. T. Tolar boat ramp would not be affected by the proposed action, although boaters using the ramp on the west side of the Wateree River would observe the construction of the diffuser outfall structure along the east side of the Wateree River. The east bank of the Wateree River, though not designated as a specific recreational area, is used for fishing and other recreational activities. During construction persons using this area for incidental recreation may be unable to access the area. Access to the river above the structure would not be limited and there are other recreational locations available within Sumter County. Recreational resources would not be significantly affected by this action.

During construction the visual resources would be temporarily affected by the construction disturbance. Individuals involved in recreational activities at the U.S. Highway 76/378 Bridge or from the W.T. Tolar boat ramp would be able to visually observe construction of the diffuser outfall structure. All force main piping will (with the exception of bridge crossings) be located underground and not impair the aesthetic qualities of the area. A 70-foot x 100-foot chain link fence would enclose the 458 square foot pump station. Within this area, a building for a backup generator with an aboveground storage tank would be constructed. This pump station at either the preferred or alternate location, while a change from the undeveloped character of the site, is compatible with area agricultural outbuildings and other small isolated structures in the area. Once construction is complete the visual resources would not be adversely affected by the proposed action.

4.1.2 Gum Swamp Alternative Route

Potential impacts to land use, recreation, and visual resources under this alternative generally would be similar to those described for the proposed action. Land use patterns and ownership would not be substantially affected and development would be consistent with applicable plans and ordinances. Individuals involved in recreational activities at the U.S. Highway 76/378 Bridge or from the W.T. Tolar boat ramp would not be able to visually observe construction of the diffuser outfall structure. Boaters on the river would observe the construction activities for the diffuser outfall structure located upstream of the U.S. Highway 76/378 bridge. This area is primarily undeveloped, with the exception of the private boat ramp on International Paper's property. Once the natural vegetation re-establishes the area disturbed for construction of the diffuser outfall structure would not substantially alter the visual resources of the area.

4.1.3 No-Action Alternative

Under the no-action alternative, the force main would not be extended to the Wateree River and treated wastewater would continue to discharge to Beech Creek. There would be no environmental consequences to Land Use, Recreation or Visual Resources.

4.2 BIOLOGICAL RESOURCES

This section analyzes the potential for direct and indirect impacts, as well as permanent and temporary impacts to biological resources from implementation of the proposed action and

alternatives. Determination of the significance of potential impacts to biological resources is based on 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of high concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of high concern. Permanent impacts were calculated for a 10-foot swath along each route; temporary impacts were assumed to occur within a 50-foot wide swath, as measured outward from the edges of the various roads along which the pipeline passes under the two alternatives.

4.2.1 Proposed Action: U.S. Highway 76/378 Route

4.2.1.1 WETLANDS

Construction activities associated with the proposed action would not result in direct permanent impacts to wetlands. Land-clearing activities and the installation of a diffuser outfall structure at the Wateree River would take place in areas not designated as wetlands (personnel communication, Perrot 2004). The proposed action could potentially cause approximately 0.4 acres of direct, permanent impact to forested wetlands found in the vicinity of Beech Creek on Claremont Road if the force main is not attached to the bridge and supported by piers on either side of the creek. However, a new bridge was constructed over Beech Creek in 2003, and much of the area has already been cleared of vegetation.

Direct, temporary impacts to approximately 3.6 acres wetlands could occur to emergent wetlands found along the south side of U.S. Highway 76/378 due to potential soil erosion from excavation and staging activities. Although NWI maps indicate wetlands in this area, these maps do not account for the raised roadbed of the highway. All construction along U.S. Highway 76/378 would be within the raised foundation/shoulder of the highway, thus minimizing potential wetland impacts. Soil erosion and stabilization practices will be taken to minimize sedimentation and siltation of wetlands. The rerouting of treated wastewater discharge to the Wateree River will result in lower water levels in Beech Creek, but not to the extent that wetlands will be adversely affected (NRCS 2003).

Indirect wetland impacts may also result due to changes in plant species composition caused by the spread of noxious weeds, and due to changes in hydrology (i.e., flow routing, drainage, etc.) caused by the installation of the force main. However, because open water would only be disturbed at the Beech Creek bridge on Claremont Road and at the Wateree River diffuser outfall structure, the potential to spread aquatic noxious weeds would be minimal.

Permanent impacts are not expected to occur to waters of the U.S., other than wetlands; however, temporary impacts may result due to the strapping of the force main to bridges at the various stream crossings. The proposed action will cross seven waters of the U.S., six along U.S. Highway 76/378, and one on Claremont Road. These waters are presently spanned by bridges.

Because the force main would be strapped to the bridges and span the bed and banks of these streams, impacts to other waters of the U.S. by the proposed action are expected to be minimal and temporary in nature.

4.2.1.2 UPLAND VEGETATION

Direct, permanent impacts to upland vegetation would result primarily from land-clearing activities. Clearing of trees and shrubs would be conducted at the preferred or alternate pump station site, and within the right-of-way along Claremont Road and Old Garners Ferry Road. Much of the right-of-way is already cleared and maintained on Claremont Road. Direct, temporary impacts to upland vegetation are anticipated due to staging and excavation activities. Indirect impacts to upland vegetation may also result from invasion by noxious weed populations in the immediate vicinity of the construction. Revegetation and construction practices discussed in Section 2.1 would minimize the spread of noxious weeds.

Table 4.2-1. Estimates of Permanent Impacts to Upland Vegetation Types Within the ROI Caused by the Proposed Action and the Gum Swamp Alternative Route

	ESTIMATED PERCENT OF PERMANENT IMPACTS	
Upland Vegetation Type	***Proposed Action***	***Gum Swamp Alternative***
Cropland/pasture	0.03	0.03
Pine Plantation	0	0
Broad-leaved Deciduous Forest	0	30
Disturbed	25	25

4.2.1.3 WILDLIFE AND AQUATIC LIFE

Potential impacts to wildlife and aquatic life from the proposed action could occur through direct and indirect impacts of force main construction and the diffuser outfall structure. Direct, permanent impacts to wildlife resources would occur due to ground clearing activities during construction of the route. Direct, temporary impacts to wildlife resources may occur due to staging and construction activities. Indirect impacts to wildlife resources may occur due to degradation of habitat.

The primary direct impact to wildlife from the proposed action is the disturbance of approximately 30 acres of existing roadside habitat. Although this roadside habitat consists primarily of vegetation normally associated with disturbed sites, it is likely that small, burrowing mammals and reptiles inhabit this area and would therefore be temporarily or permanently displaced by construction of the force main. Temporary disturbances such as noise, human presence, ground clearing, and excavation could temporarily displace these and other wildlife in the immediate vicinity of construction. Some individuals may return to the area after construction is complete. Long-term, adverse impacts to populations are not anticipated due to the relative small size of the impact area. Along Claremont Road and Old

Garners Ferry Road, tree removal would result in loss of nest sites and perches for some birds, including migratory species. Construction of the cofferdam for the diffuser outfall structure at the Wateree River and excavation of approximately 150 cubic yards of river sediments have the potential to temporarily disturb nearby aquatic life. The new discharge of treated wastewater effluent from the diffuser outfall structure into the Wateree River is expected to have minimal effects on the aquatic environment due to the higher flow of the river. In fact this is the objective of the proposed action in order to comply with the Consent Agreement. Lower water levels may occur in Beech Creek but should have minimal impact on aquatic resources. Lower levels of copper may improve the aquatic environment in Beech Creek. The primary indirect impacts to wildlife associated with the proposed action are expected to be minimal, but may include the degradation of habitat due to the invasion of noxious weeds into disturbed areas.

4.2.1.4 THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN

No direct, permanent impacts to threatened or endangered species would result from activities associated with constructing the force main. Direct, temporary impacts to threatened or endangered species due to construction of the route are expected to be minimal and would not adversely affect any listed or proposed species. No designated critical habitat would be adversely modified by any of the alternatives. In a response from the USFWS on the Draft EA they noted that no significant effect on resources protected under the Endangered Species Act would occur with the implementation of the proposed action (see Appendix A).

WILDLIFE AND FISH

No direct impacts to the bald eagle, red-cockaded woodpecker, or shortnose sturgeon are anticipated from the proposed action. The bald eagle and red-cockaded woodpecker are not typical roadside inhabitants, and the sturgeon is not known to occur in the Wateree River in or near the ROI. No critical habitat for these species has been designated within the ROI and thus adverse modification of critical habitat due to the proposed action would not occur. Noise, human presence, ground clearing, and excavation associated with construction may temporarily cause animals in the immediate vicinity of the route to avoid the area; however, this avoidance is expected to be temporary. Therefore, while there is the potential that listed animal species may be temporarily disturbed by the proposed action, any effects would not be considered adverse. Federal species of concern are also not expected to be adversely effected by the proposed action.

The proposed action is not expected to directly impact any state-listed species. The habitat type preferred by the least tern does not occur in the ROI and therefore the species should not be impacted by the proposed route. Other species of concern may temporarily avoid this area as it is impacted by noise and human presence during ground clearing and excavation activities. This impact should be temporary and not adversely affect any species of concern.

PLANTS

Of the two endangered plants, only chaffseed has the potential to occur immediately within the ROI. Canby's dropwort is generally found in open ponds and bays, and the proposed action would not affect these habitat types. Chaffseed has been found in disturbed roadsides and may be impacted by the proposed action. Removal of vegetation due to project construction could result in the loss of individual chaffseed plants if they occur within the route. Therefore, the proposed action may affect, but would not likely adversely affect this species.

Among the federal species of concern, only the dwarf burhead has been documented in a roadside. Loss of 30 acres of disturbed roadside vegetation due to project construction could result in the loss of individual dwarf burhead plants if they occur within the route. Because they are not typically associated with roadsides, no effect is expected for the remaining federal species of concern or any state-listed species.

4.2.2 Gum Swamp Alternative Route

4.2.2.1 WETLANDS

The Gum Swamp alternative would cause approximately 5.9 acres of direct, permanent impact to wetlands as construction passes through the International Paper property. A section 404 permit from the USACE would be applied for and complied with if this alternative were chosen. As with the proposed action, construction is not expected to adversely affect wetlands in the Beech Creek area due to lowered flow volumes.

The Gum Swamp alternative will cross six waters of the U.S., other than wetlands. Two of these crossings are the same as the proposed action, one at Beech Creek on Claremont Road, the other occurs along U.S. Highway 76/378 between Old Garners Ferry Road and the road into the International Paper property. The remaining four waters of the U.S. are located within Gum Swamp. Three of these streams have bridges and one is culverted under the logging road. Where bridges exist, the force main will be supported by piers installed to span the bed and banks of these streams; therefore, impacts are expected to be minimal and temporary in nature at these locations. Where bridges do not exist, the force main would be installed below the bed of the existing channel, and then back-filled to pre-disturbance contours. Therefore, impacts to these culverted other waters of the U.S. are also expected to be minimal and temporary in nature.

4.2.2.2 WILDLIFE AND AQUATIC LIFE

Direct and indirect impacts to wildlife from the Gum Swamp alternative are expected to be more pronounced than impacts associated with the proposed action. This is due in large part to the less disturbed and more productive wetland habitat that this route transects compared to the proposed action. The primary, direct impact from this alternative would be the disturbance of 28 acres of vegetation within the route easement. This vegetation removal may contribute to

the existing fragmentation of Gum Swamp caused by the logging roads, possibly causing increased predation and nest parasitism (Hunter 1990). Direct impacts also include the possible displacement or mortality of small mammals and reptiles in the immediate vicinity of construction. Wildlife near the construction may be temporarily displaced by noise and human presence. Due to the availability of similar habitat and relative small size of the impact area, long-term, adverse population impacts are not expected for these species. Along Claremont Road, Old Garners Ferry Road, and the logging roads in Gum Swamp, tree removal will result in loss of nest sites and perches for migratory and resident bird species. The new discharge of treated wastewater from the force main into the Wateree River is expected to have minimal effects on the aquatic environment due to the higher flow of the river. Lower water levels may occur in Beech Creek but should have minimal impact on the aquatic resource. Lower levels of copper may improve the aquatic environment in Beech Creek. Potential indirect impacts include the invasion of noxious weeds, further degrading the available habitat.

4.2.2.3 THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN

No direct, permanent impacts to threatened or endangered species would result due to activities associated with constructing the route. Direct, temporary impacts to threatened or endangered species due to construction of the route are expected to be minimal and not adversely affect any listed or proposed species. No designated critical habitat would be adversely modified by this alternative.

WILDLIFE AND FISH

Potential impacts associated with the Gum Swamp alternative may affect but are not likely to adversely affect wildlife and fish listed as threatened or endangered. Removal of large trees would reduce but not eliminate suitable bald eagle perching or roosting sites. Shortnose sturgeon are not known to occur in waters of Gum Swamp. Disturbance due to noise and human presence during ground clearing and excavation activities may cause these species to temporarily avoid the route area. Therefore, while there is the potential that listed animal species may be temporarily disturbed by this alternative, any effects would not be considered adverse. Federal species of concern are also not expected to be adversely affected by this alternative.

The Gum Swamp alternative is not expected to directly impact any state-listed species. The habitat type preferred by the least tern does not occur in the ROI and therefore the species should not be impacted by the alternative route. Other species of concern may temporarily avoid this area as it is impacted by noise and human presence during ground clearing and excavation activities. This impact should be temporary and not adversely affect any species of concern.

PLANTS

Of the two endangered plants, only chaffseed has the potential to occur immediately within the ROI. Canby's dropwort is generally found in open ponds and bays, and the alternative route should not affect these habitat types. Chaffseed has been found in disturbed roadsides and may be impacted by this alternative. Removal of vegetation due to project construction could result in the loss of individual chaffseed plants if they occur within the route. Therefore, the Gum Swamp alternative may affect, but would not likely adversely affect this species. Among the federal species of concern, only the dwarf burhead has been documented in a roadside. Loss of 28 acres of roadside vegetation due to project construction could result in the loss of individual dwarf burhead plants if they occur within the route. Because 9.0 acres of wetland habitat could be impacted by the Gum Swamp alternative, some federal species of concern (e.g., awnpetal meadowbeauty, Boykin's lobelia, and pineland plantain) or state-listed species could be affected.

4.2.3 No-Action Alternative

No impacts to wetlands or upland vegetation would occur as a result of the no-action alternative. No direct or indirect impacts to wildlife or their habitat or to threatened or endangered species or species of concern would occur under the no-action alternative. Copper levels above permitted limits would continue to degrade water quality in Beech Creek.

4.3 CULTURAL RESOURCES

4.3.1 Proposed Action: U.S. Highway 76/378 Route

Impacts to cultural resources are not expected under the proposed action. No NRHP-listed resources are located within the project area (National Register Information System [NRIS] 2003). A review of SHPO records (EDR 2002) also did not identify cultural resources within the project area. In addition, force main construction would take place within existing, previously disturbed, highway and road rights-of-way. Where the force main crosses Beech Creek and two other unnamed creeks, it would be attached to existing concrete bridges. Aerial photographs of the stream crossings indicate that the bridges were constructed after 1963 and before 1976 (NRCS 1963; Sumter County Assessor's Office 1976). Compliance with Section 106 of the NHPA for this action would take place prior to project construction. In the event of unanticipated discoveries of cultural resources, work would be halted at that location and the resources would be managed in compliance with Federal law and Air Force regulation. Contact was initiated with the South Carolina SHPO and their response dated November 11, 2004 is included in Appendix A.

Traditional resources have not been identified in the project area. The nearest federally recognized Native American group is the Catawba Indian Nation located near Rock Hill, South Carolina (U.S. Department of Commerce 2000). Contact was initiated with the Catawba Indian Nation regarding this action and their response is included in Appendix A.

4.3.2 Gum Swamp Alternative Route

Potential impacts to cultural resources under this alternative generally would be similar to those described for the proposed action. The majority of the force main would be laid within previously disturbed rights-of-way along roads and highways. Compliance with Section 106 of the NHPA, including archaeological survey of previously unsurveyed portions of this force main route, would take place prior to project construction. In the event of unanticipated discoveries of cultural resources, work would be halted at that location and the resources would be managed in compliance with federal law and Air Force regulation.

4.3.3 No-Action Alternative

Impacts to cultural resources are not expected under the no-action alternative. The force main would not be constructed to the Wateree River and there would be no construction or ground disturbing activities.

4.4 WATER RESOURCES

4.4.1 Proposed Action: U.S. Highway 76/378 Route

With the implementation of the proposed action, no significant impacts are expected to water resources. Construction activities along the force main route have the potential to generate soil erosion and sediment. However implementation of normal erosion control practices identified in the storm water permit to be issued by SCDEHC would minimize the amount of sediment entering water bodies. Construction of the diffuser outfall structure within Wateree River would have the potential to increase downstream turbidity during the construction period. Construction is not anticipated to have any effect on groundwater conditions in the project area.

Discharge of the base's treated wastewater into the Wateree River is not anticipated to affect the water quality of the river because the base's permitted discharge volume is less than 0.25 percent of average flows in the river. The installation of a diffuser outfall structure would provide instantaneous mixing of the treated wastewater with the river. Elimination of the base's discharge of treated wastewater to Beech Creek would reduce flow in the creek between the discharge point and where Beech Creek blends in with Gum Swamp. While there are no records of flows in this portion of Beech Creek, and the state has assigned a value of zero flow as the 7Q10, flows over and above what can be attributed to the base's discharge have been observed during field visits to the project area. These flows originate within the 9-square-mile drainage basin for the creek above the base's discharge point. The elimination of the base's discharge is not anticipated to have a significant effect on the water resources of the area. There is the potential that with the removal of the base's discharge, copper levels may be reduced and the aquatic environment in Beech Creek may improve. In a response to the Draft EA (see Appendix A), the USFWS notes that discharge into the high-flowing Wateree River is preferable to exceeding water quality standards in the low-flow Beech Creek.

Construction of approximately 1,160 feet of the force main and the diffuser outfall structure would take place within the 100-year floodplain of the Wateree River. Due to the nature of the project and the extent of the floodplain associated with the Wateree River, there is no practicable alternative that would avoid or further minimize this level of construction within the 100-year floodplain.

4.4.2 Gum Swamp Alternative Route

Under this alternative, the construction of the proposed force main and pump station would start at the same location identified in the proposed action. Construction would extend along U.S. Highway 76/378 to the turn off for Old Garners Ferry Road and proceed along the edge of existing logging roads to the discharge location on the Wateree River. Construction activities would be similar to those anticipated under the proposed action. Implementation of the erosion control practices required by the state of South Carolina would minimize the amount of sediment entering these water bodies.

Construction of approximately 12,000 feet of the force main and the discharge structure would take place within the 100-year floodplain of the Wateree River. Due to the nature of the project and the extent of the floodplain associated with the Wateree River, there is no practicable alternative that would avoid or further minimize this level of construction within the 100-year floodplain.

4.4.3 No-Action Alternative

Under the no-action alternative, the force main would not be constructed and wastewater would continue to discharge to Beech Creek. Copper levels above permitted limits will continue to be discharged to Beech Creek.

4.5 EARTH RESOURCES

4.5.1 Proposed Action: U.S. Highway 76/378 Route

Implementation of the proposed action would have minor, temporary increases in soil erosion and sedimentation. In accordance with the South Carolina Stormwater Management and Sediment Reduction Act, plans would be developed identifying the methods that would be employed to control sediment. Project details, identified in section 2.1 include silt fences, erosion bales, excavation of ditches and slopes with rounded features, and revegetation with native grasses and forbs. With the implementation of these project components, no adverse impacts are anticipated to this resource.

4.5.2 Gum Swamp Alternative Route

Under this alternative, construction of the force main pump station and diffuser outfall structure would have similar consequences as to those identified under the proposed action.

Therefore, no adverse environmental consequences are anticipated with the construction of this alternative route.

4.5.3 No-Action Alternative

Under the no-action alternative, the force main would not be extended to the Wateree River and the discharge to Beech Creek would continue. There would be no new soil disturbance and no environmental consequences to this resource.

4.6 AIR QUALITY

4.6.1 Proposed Action: U.S. Highway 76/378 Route

The air quality analysis included an assessment of direct and indirect emissions from known activities associated with the proposed action that would affect regional air quality. The activities identified as requiring evaluation included:

- Construct approximately 24,000 feet (approximately 4.9 miles) of 12-inch force main. This will include the clearance of relatively undeveloped land within the right-of-way of existing roadways and some clearance of trees/shrubs along the way; grading and trenching (30-inch wide ditch) associated with installation of the force main, fill material transport, and construction employee commuting;

- For approximately 6,400 feet, along Old Garners Ferry Road, construction would take place in the south shoulder of the road within the 50–foot right-of-way. This area is covered with bushes and trees and a strip approximately two to five feet wide would require clearing for the construction of the force main; and

- Construction of the pump station (including a backup generator). The 2.6 mgd pump station would require a construction area approximately 70 feet by 140 feet with a final cleared area of approximately 54 feet by 100 feet.

Emissions during the construction period were quantified to determine the potential impacts on regional air quality. Construction emissions were normalized to a year. Emissions of volatile organic compounds (VOCs), a precursor to O_3, nitrogen oxide (NO_x), CO, and PM_{10} from construction activities were calculated using emission factors from the *California Environmental Quality Act Air Quality Handbook* (South Coast Air Quality Management District 1993). These emission factors are used because they are the most comprehensive for construction activities. The emission factors included contributions from engine exhaust emissions (i.e., on-site construction equipment, material handling, and workers' travel) and fugitive dust emissions (e.g., from grading activities). Annual emissions from trucks with capacity of 15 cubic yards traveling 50 miles, round trip, for 60 days per year to bring fill material to the construction location were calculated using emission factors for heavy duty diesel vehicles from *Calculation*

Methods for Criteria Pollutant Air Pollutant Emission Inventories (Jagielski and O'Brien 1994). The emissions, in tons per year, from the proposed action are presented in Table 4.6-1.

Emissions generated by construction projects are temporary in nature and would end when construction is complete. The emissions from fugitive dust (PM_{10}) would be significantly less due to the implementation of control measures in accordance with standard construction practices. For instance, frequent spraying of water on exposed soil during construction, proper soil stockpiling methods, and prompt replacement of ground cover or pavement are standard landscaping procedures that could be used to minimize the amount of dust generated during construction. Using efficient grading practices and avoiding long periods where engines are running at idle may reduce combustion emissions from construction equipment. Vehicular combustion emissions from construction worker commuting may be reduced by carpooling.

Table 4.6-1. Project Emissions – Proposed Action

Criteria Pollutants	*Temporary Construction Emissions (tons per year)*
CO	4.1
VOCs	0.8
NO_x	2.2
SO_2	0.2
PM_{10}	10.1

Direct operational emissions from the proposed project would be associated with operation of a diesel-fired emergency generator. Emissions from the emergency generator would be minimal, as the operations are expected to be less than 100 hours per year. Relative to overall base emissions, the proposed project would result in minor increases in criteria pollutants.

4.6.2 Gum Swamp Alternative Route

Under this alternative, the construction of the proposed force main and pump station would start at the same location identified in the proposed action. The force main would be extended along Claremont Road to Old Garners Ferry Road. The analysis was performed assuming a trench 30 inches wide would be dug and then filled and compacted. This alternative is very similar to the proposed action except for the route and the length of the trench would drop from approximately 4.9 miles to 4.7 miles. The force main would be constructed along the edge of the road requiring the removal of six to ten feet of vegetation.

Emissions from the Gum Swamp alternative are expected to be quite similar to those from the proposed action. Although the trenching area for this alternative is less than that needed under the proposed action, the emission reductions are offset by the additional shrub/tree clearing needed under this alternative.

Direct operational emissions from this alternative would be identical to those under the proposed action and would be associated with the operation of a diesel-fired emergency generator. Emissions from the emergency generator would be minimal, as the operations are expected to be less than 100 hours per year. Relative to overall base emissions, the proposed project would result in minor increases in criteria pollutants.

4.6.3 No-Action Alternative

Under the no-action alternative, the force main would not be extended to the Wateree River. Emissions would remain the same as under current conditions. There would be no significant effects to this resource.

4.7 INFRASTRUCTURE

4.7.1 Proposed Action: U.S. Highway 76/378 Route

Implementation of the proposed action would include the construction of a pump station and force main in order to discharge the bases' treated wastewater effluent to the Wateree River. Construction of the force main would not have any adverse effects on the potable water and wastewater systems in this portion of Sumter County. The force main installed by the Air Force would not provide service to any other entity along its route.

Construction along Claremont and Old Garners Ferry Roads and U.S. Highway 376/78 would take place primarily within the road right-of way; however construction equipment may temporarily close one lane to vehicles traveling on these roads. The construction contractor would provide signage and detours if necessary. Given the low volume of traffic on these roads, no adverse effects are anticipated.

4.7.2 Gum Swamp Alternative Route

Under this alternative, construction of the force main would have similar consequences as to those identified under the proposed action. Construction within the International Paper property, from U.S. Highway 76/378 to the discharge location would not interfere with any traffic or other infrastructure. Therefore, no adverse significant effects on infrastructure are anticipated with the construction of this alternative route.

4.7.3 No-Action Alternative

Under the no-action alternative, the force main would not be constructed to the Wateree River and the discharge to Beech Creek would continue. There would be no significant effects on infrastructure.

4.8 NOISE

4.8.1 Proposed Action: U.S. Highway 76/378 Route

Implementation of the proposed action would have minor, temporary increases in localized noise levels in the vicinity of the project area during construction. The two residences in the project area would be more than 1,000 feet from the construction activity. Use of heavy equipment for site preparation and development (i.e., grading, fill, and construction) would generate noise. However, noise impacts would be similar to those associated with typical construction, be restricted to normal working hours (i.e., between 7:00 a.m. and 5:00 p.m.), and last only for the duration of project. Therefore, noise disruptions would be considered insignificant.

4.8.2 Gum Swamp Alternative Route

Construction of the force main under this alternative would have consequences similar to those identified under the proposed action. Construction within the International Paper property, from U.S. Highway 76/378 to the discharge location, could potentially disrupt hunting activities if the construction activities were to occur during deer hunting season. The forests in this area have been logged throughout the past 30 years and species in the area have been exposed to occasional noise from heavy machinery. The noise disruptions would be temporary and would be limited to daytime hours and along the existing logging roads; therefore, impacts are considered insignificant.

4.8.3 No-Action Alternative

Under the no-action alternative, the force main would not be constructed and the discharge to Beech Creek would continue. Noise levels would remain the same as they are currently.

4.9 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.9.1 Proposed Action: U.S. Highway 76/378 Route

Construction activity associated with the construction of the force main would peak in Fiscal Year (FY) 05 with the expenditure of approximately $3 million. The number of jobs generated by a project of this size represents a minor and temporary contribution to regional employment. No adverse consequences to socioeconomic resources would be expected.

Implementation of the Proposed Action would not create significantly adverse environmental effects on minority and low-income populations located along the construction corridor or downstream of the discharge location.

4.9.2 Gum Swamp Alternative Route

Construction activity and earnings associated with this alternative would be very similar to that of the proposed action. Therefore, no adverse socioeconomic consequences are anticipated with the construction of this alternative route. Implementation of this alternative would not create significantly adverse environmental effects on minority and low-income populations located along the construction corridor or downstream of the discharge location.

4.9.3 No-Action Alternative

Under the no-action alternative, the force main extension would not be constructed and wastewater would continue to discharge to Beech Creek. There would be no socioeconomic consequences to this resource.

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5.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 CUMULATIVE EFFECTS

This section provides (1) a definition of cumulative effects, (2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, (3) an assessment of the nature of interaction of the proposed action and alternatives with other actions, and (4) an evaluation of cumulative effects potentially resulting from these interactions.

5.1.1 Definition of Cumulative Effects

CEQ regulations stipulate that the cumulative effects analysis within an EA should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance in *Considering Cumulative Effects* affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action and alternatives (CEQ 1997). The scope must consider geographic and temporal overlaps and must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and alternatives and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than actions that may be geographically separated. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects.

To identify cumulative effects, this revised EA analysis addresses three questions:

1. Does a relationship exist such that elements of the proposed action might interact with elements of past, present, or reasonably foreseeable actions?

2. If one or more of the elements of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?

3. If such a relationship exists, does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

In this revised EA, an effort has been made to identify all actions that are being considered or that are in the planning phase at this time. To the extent that details regarding such actions

exist and the actions have a potential to interact with the proposed action in this revised EA, these actions are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the proposed action.

5.1.2 Past, Present and Reasonably Foreseeable Actions

This revised EA applies a stepped approach to provide decision makers with not only the cumulative effects of the proposed action but also the incremental contribution of past, present, and reasonably foreseeable actions in Sumter County.

5.1.2.1 Past Actions Relevant to the Proposed Action and Alternatives

Shaw AFB is an active military installation that undergoes continuous change in mission and in training requirements. This process of change is consistent with the United States Defense policy; the Department of Defense must be ready to respond to threats to American interests throughout the world. Since 1996, force structure changes have occurred at Shaw AFB that removed the /OA-10 aircraft while increasing the number of F-16 aircraft. In 2002, Shaw AFB implemented additional force structure policy changes with new F-16 Block 50 aircraft. This action added 12 newer F-16 Block 50 aircraft to the 20 FW and removed 18 F-16s for an overall change of six fewer aircraft. Throughout these six years (1996-2002) the amount or characteristics of the domestic wastewater discharged to Beech Creek did not significantly change.

5.1.2.2 Present Actions Relevant to the Proposed Action and Alternatives

The base, like any other major institution, also requires occasional new construction, facility improvements, and infrastructure upgrades. Currently, Shaw AFB does not have any construction activity underway that would contribute to an increase in the amount or characteristics of wastewater discharged to Beech Creek. According to staff at the Sumter City-County Planning Commission, no projects are anticipated that would have a foreseeable affect on the project area.

5.1.2.3 Reasonably Foreseeable Actions that Interact with the Proposed Action and Alternatives

This category of actions includes Air Force actions and activities within Sumter County that have a potential to coincide, either partially in time or geographic extent, with the proposed action. Information on these actions is included to determine whether these actions would, if implemented, incrementally affect environmental resources. At this time, one project has been identified along a portion of the proposed route of the force main. A fiber optic cable is planned for construction in FY 05 from Columbia, SC to Shaw AFB along the US Highway 378/76 corridor. While this project is in the initial planning stages it is not anticipated to conflict with the location of the proposed force main (personnel communication, Behr). Shaw

AFB anticipates some growth on the east side of the base which may increase the amount of wastewater discharge from its treatment plant. No new projects are proposed in this portion of Sumter County that might affect the project area.

5.1.3 Analysis of Cumulative Effects

The following analysis examines how the impacts of the actions presented above might be affected by those resulting from the proposed action: U.S. Highway 76/378 Route, the Gum Swamp Alternative Route, and the no-action alternative, and whether such a relationship would result in potentially significant impacts not identified when the proposed action or alternatives are considered individually. The no-action alternative represents status quo conditions and would not represent any change from the existing environment.

Only one fiber optic installation project has been identified in Sumter County that would produce incremental impacts when added to other past, present, or reasonably feasible future actions. Shaw AFB is an active military installation that undergoes changes in mission and in training requirements in response to defense policies, current threats, and tactical and technological advances. The base, like any other major institution (e.g., university, industrial complex), requires new construction, facility improvements, infrastructure upgrades, and maintenance and repairs. All of these factors (i.e., mission changes, facility improvements, and tenant use) will continue to occur before, during, and after the proposed action if it is selected.

For this project, those biological resources considered the most vulnerable to incremental effects and which have been repeatedly impacted by past projects are wetlands. The analysis of cumulative effects for this project considered a temporal scale of 50 years into the past (1954) to 20 years into the future (2024). This temporal scale was selected because, historically it represents the period prior to the majority of impacts to biological resources in the region and for the future, 20 years is a common planning horizon. Spatially, the cumulative effects analysis area was defined by Sumter County because the entire project is within this county and because data (e.g., lists of threatened and endangered species) are often categorized at the county level.

According to Dahl (1999), South Carolina had an estimated 4,104,850 acres of wetlands in 1989, of which 89 percent were freshwater wetlands, and 11 percent were estuarine wetlands. Palustrine forested wetlands made up the majority (70 percent) of the total wetland area. Between 1982 and 1989 agriculture, forestry and urbanization caused 81 percent of all the observed freshwater wetland losses. During this period, palustrine forested wetlands declined by 5.1 percent (155,500 acres), while palustrine shrub wetlands increased by 33.4 percent (Dahl 1999). In forested wetlands where the trees were removed, most remained as some other type of wetland. Forty percent of the forested wetlands converted to upland land uses were lost to upland managed pine plantations (Dahl 1999). While the incremental impacts to wetlands from the Gum Swamp alternative would exceed the impacts from the proposed action, the impacts would still be relatively minor and temporary. However, it is important to recognize that when the incremental impact to wetlands from the current project is added to all past impacts and impacts from projects in the foreseeable future, the current project contributes to

the cumulative loss of this resource. It is also important to recognize that wetlands provide essential habitat for many wildlife and aquatic life species and thus cumulative effects to wetlands result in cumulative effects to wildlife and aquatic life species. In some cases, these species may be sensitive, threatened, or endangered. To our knowledge, there are no future foreseeable projects that would impact wetlands in the ROI planned for construction within the 20 year planning horizon. For this reason and because the majority of impact to wetlands from the proposed action are expected to be relatively minor and temporary, the cumulative impact to wetlands from the proposed action is not considered significant.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires that environmental analysis include identification of "...any irreversible and irretrievable commitments of resources; which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

For the proposed action, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or longer lasting, but negligible.

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8.0 LIST OF PREPARERS

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B.A., Urban Affairs, Virginia Polytechnic Institute and State University, Blacksburg, 1974
Hazardous Materials Management Certificate, University of California, Riverside, 1988
Years of Experience: 26

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B.A., University of Colorado, Boulder, 1977
M.A., Anthropology, Idaho State University, Pocatello, 1980
Years of Experience: 20

Kimberly Freeman, Production Manager
Years of Experience: 16

Robert J. Henke, Biology Peer Review
B.S., Fisheries and Wildlife Management, University of Missouri, Columbia, 1982
B.S., Forestry, University of Missouri, Columbia, 1982
M.S., Wildlife Biology, University of Vermont, 1987
Years of Experience: 20

Claudia Laughlin, Graphics
Years of Experience: 6

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B.S., Chemistry & Mathematics, Bates College 1978
Ph.D., Chemistry, Purdue University 1985
Years of Experience: 20

Richard R. McEldowney, Riparian/Wetland Ecologist
M.S., Rangeland Ecosystem Science, Colorado State University, Fort Collins, 1999
B.S., Wildlife Biology, University of Montana, Missoula, 1993
Years of Experience: 8

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Years of Experience: 2

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B.S., Wildlife Biology, Colorado State University, Fort Collins, 2000
B.B.A., Management, University of Massachusetts, Amherst, 1993
Years of Experience: 2

John Whelply, P.E., Environmental Engineer
M.S., Environmental Engineering, 1997
B.S., Mechanical Engineering, 1990
Years of Experience: 11

APPENDIX A
CONSULTATION LETTERS

Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) Mailing List

U.S. Congressionals:

Congressman Lindsey Graham
P.O. Box 1155
Seneca, SC 29679

The Honorable Fritz Hollings
1835 Assembly Street, Suite 1551
Columbia, SC 29201

The Honorable John Spratt
39 E. Calhoun Street
Sumter, SC 29150

The Honorable James Clyburn
1703 Gervais Street
Columbia, SC 29201

State Legislators:

Senator Phil Leventis
601 Gressette Building
Columbia, SC 29202

Senator John Land, III
504 Gressette Building
Columbia, SC 29202

Representative Grady Brown
304B Blatt Building
Columbia, SC 29211

Representative J. David Weeks
328A Blatt Building
Columbia, SC 29211

Representative Marty Coates
327C Blatt Building
Columbia, SC 29211

Representative G. Murrell Smith, Jr.
420D Blatt Building
Columbia, SC 29211

Representative Joseph Neal
309B Blatt Building
Columbia, SC 29211

Fed Agencies:

Natural Resource Conservation Service
101 South Main Street, Room 101
Sumter, SC 29150

U.S. Fish and Wildlife Service
1835 Assembly Street, Suite 971B
Columbia, SC 29201-2448

U.S. Fish and Wildlife Service
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558

Tribes:
Mr. Gilbert Blue, Chairman
Catawba Indian Tribe
P.O. Box 188
Catawba, SC 29704

State Agencies:

South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

State Clearinghouse
Office of State Budget
1201 Main Street, Suite 950
Columbia, SC 29201

Dr. Rodger E. Stroup
South Carolina State Historic Preservation Officer
8301 Parklane Road
Columbia, SC 29223-4905

South Carolina Department of Natural Resources
Rembert C. Dennis Building, 1000 Assembly Street, Columbia, SC 29201

Mr. Mike Lefever
Deputy to Chief of Staff
P.O. Box 11829
Columbia, SC 29211

Local Government:

William H. Hoge
Planning Director
Sumter City-County Planning Commission
P.O. Box 1449
Sumter, SC 29151

Sample IICEP Letter

DEPARTMENT OF THE AIR FORCE
20th FIGHTER WING (ACC)
SHAW AIR FORCE BASE, SOUTH CAROLINA

18 MAR 2003

MEMORANDUM FOR SEE DISTRIBUTION LIST

FROM: 20 CES/CC
428 Chapin Street
Shaw AFB, SC 29152-5123

SUBJECT: Sewer Line Construction Project

1. Shaw AFB is preparing an Environmental Assessment (EA) for a proposed construction project to re-route the bases wastewater effluent from its existing discharge location into Beach Creek to a new discharge location into the Wateree River. We have contracted Science Applications International Corporation (SAIC) Environmental Solutions Division to prepare the EA for this project in an effort to evaluate any potential environmental impacts surrounding this project

2. As part of the environmental analysis, the Air Force or SAIC may contact you during data collection efforts. If you have any comments or concerns about this project, you may contact the EA Project Manager, 2Lt Shamekia Toliver, at (803) 965-5006 or via e-mail at shamekia.toliver@shaw.af.mil.

JEFFREY A. JACKSON, Lt Col, USAF
Commander

Attachment:
Distribution List

Global Power For America

U.S. Congressionals:

Congressman Lindsey Graham
P.O. Box 1155
Seneca, SC 29679

The Honorable Fritz Hollings
1835 Assembly Street, Suite 1551
Columbia, SC 29201

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Rembert C. Dennis Building, 1000
Assembly Street, Columbia, SC 29201

Mr. Mike Lefever
Deputy to Chief of Staff
P.O. Box 11829
Columbia, SC 29211

Local Government:

William H. Hoge
Planning Director
Sumter City-County Planning Commission
P.O. Box 1449
Sumter, SC 29151

Key Agency Contacts

Science Applications International Corporation
An Employee-Owned Company

DATE: February 11, 2003

TO: U.S. Fish and Wildlife Service
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558

FROM: David Dischner, Project Manager
Science Applications International Corporation
22 Enterprise Parkway, Suite 200
Hampton, VA 23666

SUBJECT: Environmental Assessment (EA) for the Wateree Sewer Line Extension for Shaw AFB

Shaw AFB is preparing an EA in support of the extension of the base's sewer line and discharge to the Wateree River. The analysis will evaluate potential environmental impacts for the following key components of the proposed action:

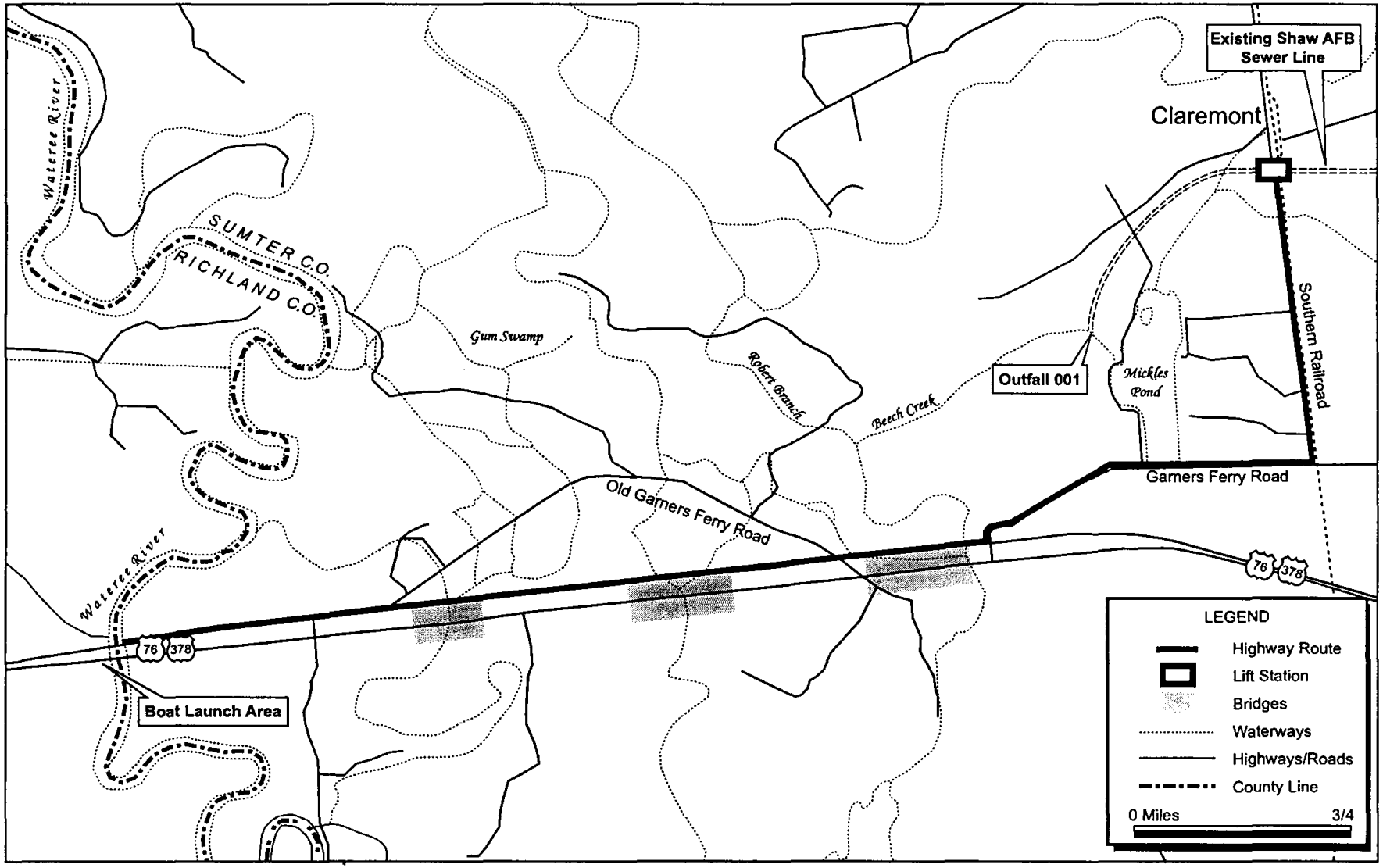
- Construction of a 1.8 million gallon per day lift station on Claremont Road.
- Construction of approximately 4.9 miles of a 16-inch sewer line from the lift station to the Wateree River. Construction associated with the proposed action would take place within the existing rights-of-way of Claremont Road, Garners Ferry Road, and US Highway 378/76. Construction of the Gum Swamp alternative would include approximately two miles adjacent to a logging road as shown in the attached maps.
- Construction of a new discharge structure on the Wateree River.

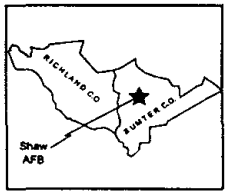
In order to support the environmental analysis, please send us a current list of animal species designated as threatened or endangered, candidates for listing as threatened or endangered, and any other species tracked by your agency that may occur in the vicinity of the proposed action. Additionally, we request that you address specific concerns for any of these species with respect to the proposed action. If possible, please submit this information by March 10, 2003.

Please contact me with any questions or comments at (757) 223-1065. Your written comments may be addressed to me at SAIC, 22 Enterprise Parkway, Suite 200 Hampton, VA 23666 If you would like, you can also send e-mail to dischnerd@saic.com.

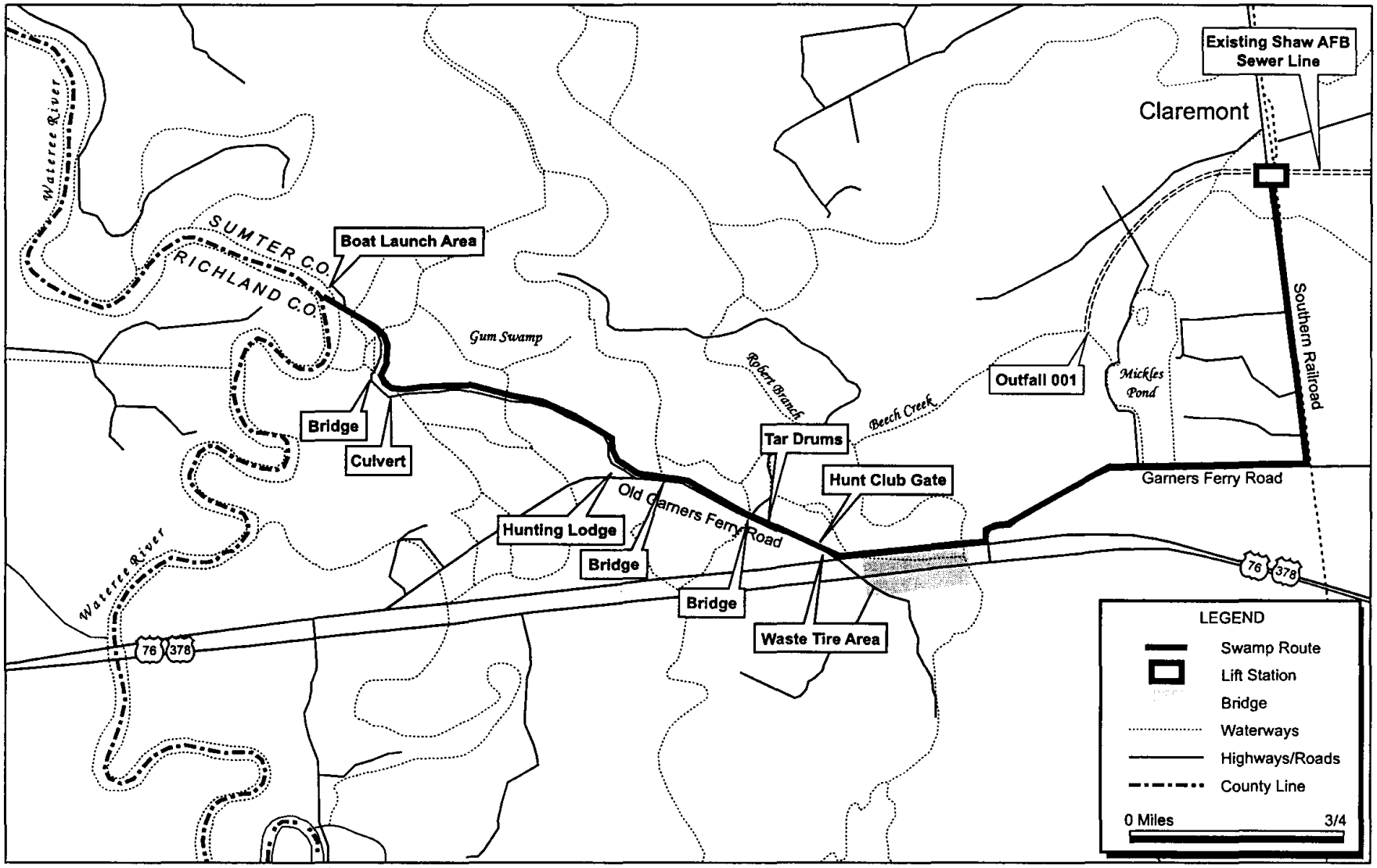
Thank you for your assistance in this matter.

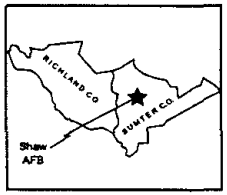
Attachments: Maps of Proposed Action and Gum Swamp Alternative Alignments





Highway Route
Proposed Sewer Outfall Route





Gum Swamp Route
Proposed Sewer Outfall Route

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

April 2, 2003

Mr. David Dischner
Project Manager
Science Applications International Corporation
22 Enterprise Parkway, Suite 200
Hampton, Virginia 23666

Re: Environmental Assessment for the Wateree Sewer Line Extension for Shaw AFB
Sumter County, South Carolina
FWS Log No. 4-6-03-T180

Dear Mr. Dischner:

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced project and offers the following comments. The proposed project consists of two alternatives for the extension of a sewer line. Specifically, alternative one involves the construction of approximately 4.9 miles of 16-inch sewer line within the rights-of-way of US Hwy. 378/76. Alternative two involves the construction of the same size line through Gum Swamp for approximately two miles adjacent to a logging road. Also proposed for both alternatives is the construction of a 1.8 million gallon per day lift station adjacent to Claremont Road and construction of a new discharge structure on the Wateree River.

We are providing a list of federally listed species and species of concern which have the potential to occur in Sumter County to aid you in determining the impacts your project may have on protected species. This list includes known occurrences and areas where the species has a high possibility of occurring. Records are updated continually and may be different from the following. This list should be used only as a guideline, not as the final authority.

Common Name	Scientific Name	Status	Occurrence
Bald eagle	*Haliaeetus leucocephalus*	T	Known
Red-cockaded woodpecker	*Picoides borealis*	E	Known
Shortnose sturgeon	*Acipenser brevirostrum**	E	Known
Canby's dropwort	*Oxypolis canbyi*	E	Known
Chaff-seed	*Schwalbea americana*	E	Known
Southern Dusky Salamander	*Desmognathus auriculatus*	SC	Possible
Dwarf burhead	*Echinodorus parvulus*	SC	Known

Boykin's lobelia	*Lobelia boykinii*	SC	Known
Pineland plantain	*Plantago sparsiflora*	SC	Known
Awned meadowbeauty	*Rhexia aristosa*	SC	Known
Biltmore greenbrier	*Smilax biltmoreana*	SC	Known
Bachman's sparrow	*Aimophia aestivalis*	SC	Known
Henslow's sparrow	*Ammodramus henslowii*	SC	Known
American kestrel	*Falco sparverius*	SC	Possible
Loggerhead shrike	*Lanius ludovicianus*	SC	Possible
Painted bunting	*Passerina ciris ciris*	SC	Possible
Madtom, broadtail	Noturus sp 2	SC	Possible

T- Federally Threatened, E- Federally Endangered, SC- Species of Concern

Should the project require alteration of habitat which coincides with the habitat required for any of the listed species, an on-site inspection or survey of the area must be conducted to determine if listed species are present or occur seasonally. Surveys should be done by qualified personnel and be conducted during the appropriate time of day and or year (i.e., flowering time for plants) to ensure confidence in survey results. Please notify this office with the results of any surveys for the above list of species and an analysis of the "effects of the action," as defined by 50 CFR 402.02 on any listed species including consideration of direct, indirect, and cumulative effects.

We also recommend you contact the S.C. Department of Natural Resources (SCDNR), Data Manager, Wildlife Diversity Section, Columbia, SC 29202, concerning known populations of federal and/or state endangered or threatened species, and other sensitive species in the project area. Additional habitat information may also be available from SCDNR. The National Marine Fisheries Service, 9721 Executive Center Drive North St. Petersburg, FL 33702-2449 should be contacted for consultation on species under their jurisdiction.

In accordance with the provision of the Fish and Wildlife Coordination Act, the Service has also reviewed the project with regards to the effects the proposed action may have on wetlands and other related aquatic resources. We recommend that project plans be developed to avoid impacting wetland areas and reserve the right to review any required federal or state permits at the time of public notice issuance. The U.S. Army Corps of Engineers should be contacted to assist you in determining if wetlands are present or if a permit is required for this activity.

Additionally, it appears that either alternative would require the crossing of perennial streams. To minimize negative impacts to these aquatic systems, we request that stream crossings be achieved by either attaching the new sewer line to an existing structure (i.e., bridge), or by directional drilling to avoid open trenching of the stream. Furthermore, we believe and recommend that the highway alternative be considered as the primary route as it appears to have the least amount of required impacts to natural resources.

Thank you for this opportunity for input at this early planning stage. In future correspondence coming this project please reference FWS Log No. 4-6-03-T180.

Sincerely yours,

Roger L. Banks
Field Supervisor

RLB/PMD/km

South Carolina Department of
Natural Resources

Paul A. Sandifer, Ph.D.
Director
William S. McTeer
Deputy Director for
Wildlife and Freshwater Fisheries

August 14, 2003

Mr. David Dischner, Project Manager
Science Application International Corporation
22 Enterprise Parkway, Suite 200
Hampton, VA 23666

RE: EA for the Wateree Sewer Line Extension for Shaw AFB

Dear Mr. Dischner,

Because our database does not represent a comprehensive biological inventory of the state, I can only verify that there are no occurrences in the vicinity of your project. There may be occurrences of species in the vicinity of your project area that have not been reported to us. Fieldwork remains the responsibility of the investigator.

I have checked our database, and, as you hopefully observed on our web site, there are no known occurrences of any federally or state listed threatened or endangered species within a mile of the project site. I did observe that there are two occurrences of species of concern that fall within a mile of the western end of the project area. They are *Ursus americanus* (Black Bear) and *Macbridea caroliniana* (Carolina Bird-in-a-nest). As an indication of other potential occurrences in the area, I have enclosed a list of rare, threatened, and endangered species for Sumter & Richland counties. The highlighted ones are of legal significance. The remaining species on the list are of concern in the state. As a professional courtesy, we ask that you acknowledge S.C. Heritage Trust as a source of information whenever you use this data in maps or reports.

If you need additional assistance, please contact me by phone at 803/734-3917 or by e-mail at JulieH@scdnr.state.sc.us.

Sincerely,

Julie Holling

Julie Holling, Data Manager
SC Department of Natural Resources
Heritage Trust Program

Encl.

RARE, THREATENED, AND ENDANGERED SPECIES OF SUMTER COUNTY

STATUS	GRANK	SRANK	SCIENTIFIC NAME	COMMON NAME
ANIMALS:				
SC	G5T5	S5	ACRIS CREPITANS CREPITANS	NORTHERN CRICKET FROG
SE	G3G4	S2?	CORYNORHINUS RAFINESQUII	RAFINESQUE'S BIG-EARED BAT
FT/SE	G4	S2	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE
SC	G5	S4	ICTINIA MISSISSIPPIENSIS	MISSISSIPPI KITE
SC	G5	S2	MICRURUS FULVIUS	EASTERN CORAL SNAKE
FE/SE	G3	S2	PICOIDES BOREALIS	RED-COCKADED WOODPECKER
ST	G4	S3	STERNA ANTILLARUM	LEAST TERN
SC	G5	S3?	URSUS AMERICANUS	BLACK BEAR
PLANTS:				
SC	G4?	S?	ARISTIDA CONDENSATA	PIEDMONT THREE-AWNED GRASS
SC	G3	S?	CAREX DECOMPOSITA	CYPRESS-KNEE SEDGE
RC	G4	S1	CARYA MYRISTICIFORMIS	NUTMEG HICKORY
SC	G5	S?	CHAMAEDAPHNE CALYCULATA	LEATHERLEAF
SC	G4?	S?	CYPERUS LECONTEI	LECONTE FLATSEDGE
SC	G3Q	S2	ECHINODORUS PARVULUS	DWARF BURHEAD
SC	G5?	S?	ECHINODORUS TENELLUS	DWARF BURHEAD
SC	G4G5	S?	ELEOCHARIS ROBBINSII	ROBBINS SPIKERUSH
SC	G3G4Q	SR	EUPATORIUM RECURVANS	COASTAL-PLAIN THOROUGH-WORT
SC	G2G3	S?	LOBELIA BOYKINII	BOYKIN'S LOBELIA
SC	G4	S2	NESTRONIA UMBELLULA	NESTRONIA
FE/SE	G2	S1	OXYPOLIS CANBYI	CANBY'S DROPWORT
SC	G3	S?	PLANTAGO SPARSIFLORA	PINELAND PLANTAIN
SC	G3	S2	RHEXIA ARISTOSA	AWNED MEADOWBEAUTY
SC	G4G5	SR	RHEXIA CUBENSIS	WEST INDIAN MEADOW-BEAUTY
SC	G4	SR	RHYNCHOSPORA SCIRPOIDES	LONG-BEAKED BALDRUSH
SC	G5T3T4	S?	RUELLIA CAROLINIENSIS SSP CILIOSA	A PETUNIA
SC	G4?	S2	SAGITTARIA ISOETIFORMIS	SLENDER ARROW-HEAD
FE/SE	G2	S2	SCHWALBEA AMERICANA	CHAFFSEED
SC	G4	S1S2	SCLERIA BALDWINII	BALDWIN NUTRUSH

RARE, THREATENED, AND ENDANGERED SPECIES OF RICHLAND COUNTY

STATUS	GRANK	SRANK	SCIENTIFIC NAME	COMMON NAME
ANIMALS:				
SC	G5	S3?	CONDYLURA CRISTATA	STAR-NOSED MOLE
SE	G3G4	S2?	CORYNORHINUS RAFINESQUII	RAFINESQUE'S BIG-EARED BAT
SC	G4	S?	ELIMIA CATENARIA	GRAVEL ELIMIA
SC	G3	S?	ETHEOSTOMA COLLIS	CAROLINA DARTER
SC	G5	S1	FUNDULUS DIAPHANUS	BANDED KILLIFISH
FT/SE	G4	S2	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE
SC	G2	S?	HETERODON SIMUS	SOUTHERN HOGNOSE SNAKE
ST	G4	S2S3	HYLA ANDERSONII	PINE BARRENS TREEFROG
SC	G4	S1?	NOTROPIS CHILITICUS	REDLIP SHINER
FE/SE	G3	S2	PICOIDES BOREALIS	RED-COCKADED WOODPECKER
SC	G5	S1	RHINICHTHYS ATRATULUS	BLACKNOSE DACE
SC	G5	S4	SCIURUS NIGER	EASTERN FOX SQUIRREL
SC	G5	S4	SPILOGALE PUTORIUS	EASTERN SPOTTED SKUNK
SC	G5	S?	STROPHITUS UNDULATUS	SQUAWFOOT
SC	G5	S2S3	SYLVILAGUS AQUATICUS	SWAMP RABBIT
SC	G5	S4	TYTO ALBA	BARN-OWL
SC	G5	S3?	URSUS AMERICANUS	BLACK BEAR
SC	G4	S?	VILLOSA DELUMBIS	EASTERN CREEKSHELL
PLANTS:				
SC	G4Q	S?	AGALINIS TENELLA	
SC	G5T3T4	S1	ANDROPOGON PERANGUSTATUS	NARROW LEAVED BLUESTEM
SC	G4?	S?	ARISTIDA CONDENSATA	PIEDMONT THREE-AWNED GRASS
SC	G3G4	S?	ASTER ELLIOTTII	ELLIOTT'S ASTER
SC	G3	S?	ASTRAGALUS MICHAUXII	SANDHILLS MILKVETCH
SC	G2G3	S?	BALDUINA ATROPURPUREA	PURPLE BALDUINA
SC	G4?	S?	BOTRYCHIUM LUNARIOIDES	WINTER GRAPE-FERN
NC	G4	S?	CALAMOVILFA BREVIPILIS	PINE-BARRENS REED-GRASS
SC	G4G5	SR	CAREX CHEROKEENSIS	CHEROKEE SEDGE
SC	G4	S1	CAREX COLLINSII	COLLINS' SEDGE
SC	G5	S?	CAREX CRUS-CORVI	RAVENFOOT SEDGE
SC	G4?	S?	CAREX ELLIOTTII	ELLIOTT'S SEDGE
SC	G4	S?	CAREX SOCIALIS	SOCIAL SEDGE
SC	G4	S?	CAYAPONIA BOYKINII	CAYAPONIA
SC	G3G4	S?	COLLINSONIA SEROTINA	SOUTHERN HORSE-BALM
SC	G3G5	S?	COREOPSIS GLADIATA	SOUTHEASTERN TICKSEED
SC	G5	S?	DRYOPTERIS CARTHUSIANA	SPINULOSE SHIELD FERN
FE/SE	G2	S1	ECHINACEA LAEVIGATA	SMOOTH CONEFLOWER
SC	G4G5	S?	ELEOCHARIS ROBBINSII	ROBBINS SPIKERUSH
NC	G2Q	S2	HYMENOCALLIS CORONARIA	SHOALS SPIDER-LILY
RC	G2G3	S1	HYPERICUM ADPRESSUM	CREEPING ST. JOHN'S-WORT
SC	G4	S?	HYPERICUM NITIDUM	CAROLINA ST. JOHN'S-WORT
SC	G4	S3	ILEX AMELANCHIER	SARVIS HOLLY
SC	G4G5	S?	IPOMOPSIS RUBRA	RED STANDING-CYPRESS
SC	G4G5	S?	JUNCUS ABORTIVUS	PINEBARREN RUSH
SC	G4G5	S?	LECHEA TORREYI	PIEDMONT PINWEED
SC	G3G4	S?	LIATRIS MICROCEPHALA	SMALL-HEAD GAYFEATHER
RC	G2	S?	LINDERA SUBCORIACEA	BOG SPICEBUSH
SC	G?	S?	LOBELIA SP 1	LOBELIA

STATUS	GRANK	SRANK	SCIENTIFIC NAME	COMMON NAME
SC	G3G4	S?	LUDWIGIA SPATHULATA	SPATULATE SEEDBOX
SC	G3	S?	LYCOPUS COKERI	CAROLINA BUGLEWEED
FE/SE	G3	S1	LYSIMACHIA ASPERULIFOLIA	ROUGH-LEAVED LOOSESTRIFE
SC	G2G3	S?	MACBRIDEA CAROLINIANA	CAROLINA BIRD-IN-A-NEST
SC	G5	S?	MAGNOLIA MACROPHYLLA	BIGLEAF MAGNOLIA
RC	G4	S1	MAGNOLIA PYRAMIDATA	PYRAMID MAGNOLIA
RC	G3	S2	MYRIOPHYLLUM LAXUM	PIEDMONT WATER-MILFOIL
SC	G4	S2	NESTRONIA UMBELLULA	NESTRONIA
SC	G5	S?	OPHIOGLOSSUM VULGATUM	ADDER'S-TONGUE
FE/SE	G2	S1	OXYPOLIS CANBYI	CANBY'S DROPWORT
SC	G5	S?	PASPALUM BIFIDUM	BEAD-GRASS
SC	G4	S?	PITYOPSIS PINIFOLIA	PINE-LEAVED GOLDEN ASTER
SC	G2	S?	PLAGIOCHILA SULLIVANTII	
SC	G4	S1	POTAMOGETON CONFERVOIDES	ALGAE-LIKE PONDWEED
SC	G4	S?	PRUNUS ALABAMENSIS	ALABAMA BLACK CHERRY
SC	G5	S1S2	PSILOTUM NUDUM	WHISK FERN
SC	G2	S2	PTEROGLOSSASPIS ECRISTATA	CRESTLESS PLUME ORCHID
SC	G3	S2	RHEXIA ARISTOSA	AWNED MEADOWBEAUTY
SC	G2	S2	RHODODENDRON EASTMANII	MAY WHITE
SC	G3G4	S?	RHYNCHOSPORA INUNDATA	DROWNED HORNEDRUSH
SC	G3	S?	RHYNCHOSPORA MACRA	BEAK RUSH
SC	G4	S?	RHYNCHOSPORA OLIGANTHA	FEW-FLOWERED BEAKED-RUSH
SC	G3	S?	RHYNCHOSPORA PALLIDA	PALE BEAKRUSH
SC	G4	S?	RHYNCHOSPORA STENOPHYLLA	CHAPMAN BEAKRUSH
SC	G5	S?	RORIPPA SESSILIFLORA	STALKLESS YELLOWCRESS
SC	G3	S1	SARRACENIA RUBRA	SWEET PITCHER-PLANT
SC	G3G4	S?	SCIRPUS ETUBERCULATUS	CANBY BULRUSH
SC	G3	S?	TOFIELDIA GLABRA	WHITE FALSE-ASPHODEL
SC	G4G5	S?	TREPOCARPUS AETHUSAE	AETHUSA-LIKE TREPOCARPUS
SC	G?	S?	TRIDENS CHAPMANII	CHAPMAN'S REDTOP
SC	G4G5	S?	URTICA CHAMAEDRYOIDES	WEAK NETTLE
NC	G4G5T1	S1	VACCINIUM CRASSIFOLIUM SSP SEMPERVIRENS	RAYNER'S BLUEBERRY
SC	G4	S?	WAREA CUNEIFOLIA	NUTTALL WAREA

DEPARTMENT OF THE AIR FORCE
20th FIGHTER WING (ACC)
SHAW AIR FORCE BASE, SOUTH CAROLINA

OCT 0 7 2004

MEMORANDUM FOR ALL INTERESTED GOVERNMENT AGENCIES, INDIVIDUALS, ORGANIZATIONS, AND PUBLIC LIBRARIES

FROM: 20 CES/CEV
345 Cullen Street
Shaw AFB, SC 29152

SUBJECT: Draft Environmental Assessment (EA) for Construction of Force Main and Discharge to Wateree River for Shaw Air Force Base (AFB) SC

1. We are pleased to provide you with the Draft Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI)/ Finding of No Practicable Alternative (FONPA) for the construction of a pump station and force main, and discharge to the Wateree River for Shaw AFB. This construction would enable Shaw AFB to comply with South Carolina copper discharge limits for the treated wastewater it is currently discharging to Beech Creek.

This Draft EA is prepared in compliance with the National Environmental Policy Act and regulations of the President's Council on Environmental Quality. The EA analyzes the potential impacts from the proposed construction of the pump station and force main and discharge to the Wateree River of treated wastewater from Shaw AFB. The EA also analyzed an alternative construction of a force main across Gum Swamp.

2. Libraries are requested to file this Draft EA for public access and reference.

If additional information is needed, please contact:

1 Lt Suzanne Ovel
20 FW/PA
517 Lance Ave., Suite 106
Shaw AFB SC 29152
Telephone: (803) 895-2025

Correspondence and comments should be sent to:

Ms. Beth Behr
20 CES/CEV
345 Cullen Street
Shaw AFB SC 29152

3. All comments are requested by close of business, 12 Nov 04.

R. Marshall Dixon

R. MARSHALL DIXON
Environmental Flight Chief

1 Atch
Draft EA

Global Power For America

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

November 2, 2004

Ms. Beth Behr
20 CES/CEV
345 Cullen Street
Shaw AFB, SC 29152

Re: Draft EA for Construction of Force Main and Discharge to Wateree River
FWS Log No: 4-6-05-I-005

Dear Ms. Behr:

The U.S. Fish and Wildlife Service (Service) has reviewed your October 7, 2004, draft environmental assessment requesting concurrence with the Air Force's conclusion of no significant effects on listed species regarding the above-referenced project. The proposed project consists of two alternatives for the extension of a sewer line. Specifically, alternative one involves the construction of approximately 4.9 miles of 16-inch sewer line within the rights-of-way of US Hwy. 378/76. Alternative two involves the construction of the same size line through Gun Swamp for approximately two miles adjacent to a logging road. Both alternatives propose construction of a 1.8 million gallon per day lift station adjacent to Claremont Road and construction of a new discharge structure on the Wateree River. The following comments are provided in accordance with the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), and section 7 of the Endangered Species Act (Act), as amended (16 U.S.C. 1531-1543).

The purpose of this action is to discharge effluent from the Shaw AFB wastewater treatment plant into a higher flow stream, thus enabling compliance with discharge limits for copper. Copper is a highly toxic heavy metals to many aquatic organisms. Freshwater mussels, especially in larval and juveniles stages, have been found to be more sensitive to heavy metals than frequently tested fish and aquatic insects. For this reason, established water quality guidelines may not be sufficient to protect all life stages of native freshwater mussels. Diluting wastewater discharge in a high-flow receiving stream, such as the Wateree, is preferable to exceeding water quality standards in a low-flow receiving stream; however, the ideal solution is to reduce the amount of copper in the effluent discharge. Although discharge of wastewater into the Wateree River is not the preferred solution for meeting wastewater effluent standards, we are not aware of any

federally listed species that would be negatively impacted by the proposed sewer line extension.

Based on our review of the Heritage Trust Database and information provided, we concur with your determination that the proposed action will have no significant effect on resources under the jurisdiction of the Service that are currently protected by the Act. In view of this, the Service believes that the requirements of Section 7 of the Act have been fulfilled relative to the proposed action, and no further consultation is necessary at this time. However, obligations under Section 7 of the Act must be reconsidered if: (1) new information reveals that the proposed project may affect listed species in a manner or to an extent not previously considered, (2) the proposed project is subsequently modified to include activities which were not considered during this consultation; or (3) new species are listed or critical habitat designated that might be affected by the proposed project.

Your interest in ensuring the protection of endangered species is appreciated. If you have further questions or require additional information, please contact Lora Zimmerman of this office at (843) 727-4707 ext. 23. In future correspondence concerning this project, please reference FWS Log No. 4-6-05-I-005.

Sincerely,

Timothy N. Hall
Field Supervisor

TNH/LLZ/km

STATE OF SOUTH CAROLINA
State Budget and Control Board
OFFICE OF STATE BUDGET

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FRANK W. FUSCO
EXECUTIVE DIRECTOR

1201 Main Street, Suite 950
COLUMBIA, SOUTH CAROLINA 29201
(803) 734-2280

LES BOLES
DIRECTOR

November 1, 2004

R. Marshall Dixon
Shaw Air Force Base
20CES/CEV
345 Cullen Street
Shaw AFB, SC 29152

Project Name: Environmental Assessment for Construction of Force Main & Discharge to Wateree River for Shaw Air Force Base, SC

State Application Identifier: SC041002-62

Dear Chief Dixon:

The State Clearinghouse, Office of State Budget, has conducted an intergovernmental review of the project referenced above as provided by Presidential Executive Order 12372. All comments received, if any, as a result of the review are enclosed for your information.

The Clearinghouse does not have information on the Federal agency's review status. Please contact your Federal grantor agency with any questions concerning the status of your application.

The State Application Identifier indicated above should be used in any future correspondence with this office.

Sincerely,

Jean Manheimer

Jean Manheimer
Fiscal Manager, Grant Services

THPO
Catawba Indian Nation
Tribal Historic Preservation Office
P. O. Box 750
Rock Hill, South Carolina 29731
803-328-2427 Fax 803-328-5791
ccppcrafts.com

THPO # 2005-7-1

25 October 2004

Ms. Beth Behr
20 CES/CEV
345 Cullen Street
Shaw FRB SC 29152

RE: Draft Environmental Assessment for Construction of Force Main and Discharge to Wateree River for Shaw Air Force Base, SC.

Dear Ms. Behr,

This letter is acknowledgement of receipt of the Draft Environmental Assessment and Draft Finding of No Significant Impact for a pump station and force main, for Shaw AFB dated 7 October 2004.

Please send a copy of the State Historic Preservation Office letter of concurrence when you receive one. The mailing address you have for our office is incorrect. Please send mail to Dr. Wenonah Haire, THPO, P. O. Box 750, Rock Hill, SC 29731. Thank you.

If you have questions, please feel free to contact our office at 803-328-2427, Beckee Garris, ext. 232 or Sandra Reinhardt, ext. 233.

Sincerely,

Sandra Reinhardt for Wenonah G. Haire

Wenonah G. Haire
Tribal Historic Preservation Officer

cc: Gilbert Blue, Chief, Catawba Indian Nation
Executive Committee, Catawba Indian Nation
John E. George, Traditional Medicine, Catawba Indian

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WGH/ssr

South Carolina Archives History Center

History & Heritage For All Generations

November 11, 2004

R. Marshall Dixon
Department of the Air Force
20 CES/CEV
345 Cullen Street
Shaw Air Force Base, SC 29152

Re: Draft Environmental Assessment for Construction of Force Main and Discharge to Wateree River for Shaw Air Force Base, SC

Dear Mr. Dixon:

Thank you for your letter of October 7th and the draft environmental assessment for the above-referenced project, which we received on October 12th. The draft shows two possible plans for action, the proposed plan that follows US Highway 76/378 and an alternative plan that passes through Gum Swamp.

The proposed plan described in the draft assessment follow existing rights-of way for Claremont Road, Old Garners Ferry Road and Highway 76/378. For this proposal our office knows of no properties included in or eligible for inclusion in the National Register of Historic Places that will be affected by this project.

An alternative plan described as the Gum Swamp Alternative is also proposed in the draft assessment. This alternative route veers from the rights-of-way referred to above along Highway 76/378 and follows logging roads owned and maintained by International Paper north and west until discharge at the Wateree River. There may be important archaeological sites along these privately owned roads that could be adversely affected by this alternative project. Should the Gum Swamp alternative route be used, our office would like additional information on possible resources in the area and may ask for a cultural resources survey for the project.

These comments are provided as evidence of your consultation with the State Historic Preservation Office pursuant to Section 106 of the National Historic Preservation Act, as amended. If you have questions, please call me at (803) 896-6169.

Sincerely,

Richard Sidebottom
Review and Compliance Coordinator
State Historic Preservation Office

D H E C
PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

December 6, 2004

Dept. of the Air Force
20 CES/CEV
345 Cullen Street
Shaw AFB, SC 29152
Attn: Gary Cox

Re: Comments Regarding the Environmental Assessment (EA) for Constuction of Pump Station, Force Main, an Discharge to Wateree River for Shaw AFB

Dear Mr. Cox:

The South Carolina Department of Health and Environmental Control's Bureau of Water administers applicable regulations pertaining to water quality standards and classifications, including wetland protection, in accordance with the South Carolina Pollution Control Act, the Federal Clean Water Act, the State Stormwater Management and Sediment Reduction Act, and associated regulations for all of these statutes.

To ensure protection and maintenance of water quality standards and classified uses, including wetlands functions, the Department recommends the following issues be addressed when planning and constructing this project:

1. Any placement of fill material in waters of the state, including jurisdictional wetlands will require a Department administered Section 401 Certification and an Army Corps of Engineers administered Section 404 Permit. When evaluating applications for fill in wetlands, demonstration of avoidance of wetland impacts, minimization of wetland impacts and mitigation of unavoidable wetland impacts provides assurances that impacts have been reduced to the extent possible and that water quality standards will be maintained. Documentation of these measures will be required.

2. A Navigable Waters Permit will also be required for all construction within navigable waters of South Carolina.

3. Any point source discharge into a stream or river will require a Department administered National Pollution Discharge Elimination System (NPDES) Permit.

4. Any non-point discharges into a stream or river from construction areas exceeding 1 acre will require a Department administered Stormwater Management and Sediment Reduction Permit or an NPDES Stormwater Permit. All project involving sewer projects must be consistent with Water Quality Management Planning, Section 208 of the Clean Water Act.

5. Plans for installation of the water lines must be submitted to SCDHEC, Division of Water Supply Construction for review and approval prior to installation.

Other regulations not administered by this Bureau may apply to your project. Thank you for the opportunity to comment on this project. Please call Amanda Avildsen at (803) 898-3820 if you have any questions.

Sincerely,

M. Rheta Geddings, Director
Division of Water Quality

MRG: AAA

APPENDIX B
PLANT AND WILDLIFE SPECIES WITHIN SHAW AFB EA ROI

Table B-1. Wildlife Species Likely Found Within the Shaw AFB EA ROI
(Page 1 of 4)

Common Name	*Scientific Name*
Mammals	
Beaver	*Castor canadensis*
Black duck	*Anas reburpes*
Bobcat	*Lynx rufus*
Cotton mouse	*Peromyscus gossypinus*
Eastern chipmunk	*Tamia striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern harvest mouse	*Reithrodontomys humulis*
Eastern mole	*Scalopus aquaticus*
Gray fox	*Urocyon cinereoargenteus*
Gray squirrel	*Sciurus carolinensis*
Hispid cotton rat	*Sigmodon hispidus*
Longtail weasel	*Mustela frenata*
Mallard	*Anas platyrhynchos*
Marsh rabbit	*Sylvilagus palustris*
Meadow vole	*Microtus pennsylvanicus*
Mink	*Mustela vison*
Mourning dove	*Zenaida macroura*
Muskrat	*Ondatra zibethica*
Northern bobwhite	*Colinus virginianus*
Opossum	*Didelphis marsupialis*
Raccoon	*Procyon lotor*
River otter	*Lontra canadensis*
Shorttail shrew	*Blarina brevicauda*
Southeastern shrew	*Sorex longirostris*
Southern flying squirrel	*Glaucomys volans*
Star-nosed mole	*Condylura cristata*
White-tailed deer	*Odocoileus virginianus*
Wild turkey	*Melagris gallopavo*

Table B-1. Wildlife Species Likely Found Within the Shaw AFB EA ROI
(Page 2 of 4)

Common Name	***Scientific Name***
Birds	
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
American woodcock	*Philohela minor*
Bald eagle	*Haliaeetus leucocephelus*
Barred owl	*Strix varia*
Belted kingfisher	*Megaceryle alcyon*
Black vulture	*Coragyps atratus*
Black-throated blue warbler	*Dendroica caerulescens*
Blue jay	*Cyanocitta cristata*
Broad-winged hawk	*Buteo platypterus*
Brown-headed cowbird	*Molothrus ater*
Carolina chickadee	*Parus carolinensis*
Common grackle	*Quiscalus quiscula*
Cooper's hawk	*Accipiter cooperii*
Eastern kingbird	*Tyrannus tyrannus*
Great blue heron	*Andea herodias*
Great-crested flycatcher	*Myiarchus crinitus*
Green heron	*Butorides striatus*
Northern cardinal	*Cardinalis cardinalis*
Northern harrier	*Circus cyaneus*
Red-eyed vireo	*Vireo olivaceus*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged black bird	*Adelaius phoeniceus*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Sharp-shinned hawk	*Accipter striatus*
Solitary vireo	*Vireo solitarius*
Tufted titmouse	*Parus bicolor*

Table B-1. Wildlife Species Likely Found Within the Shaw AFB EA ROI
(Page 3 of 4)

Common Name	***Scientific Name***
Turkey vulture	*Cathartes aura*
Reptiles and Amphibians	
Bronze frog	*Rana clamitans clamitans*
Bullfrog	*Rana catesbeiana*
Common snapping turtle	*Chelydra serpentina*
Eastern box turtle	*Terrapene carolina carolina*
Eastern cottonmouth	*Agkistrodon piscivorus piscivorus*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Eastern hognose snake	*Heterodon platyrhinos*
Eastern kingsnake	*Lampropeltis getulus getulus*
Eastern mud snake	*Farancia abacura abacura*
Eastern mud turtle	*Kinosternon subrubrum subrubrum*
Eastern painted turtle	*Chrysemys picta picta*
Eastern ribbon snake	*Thamnophis sauritus sauritus*
Eastern tiger salamander	*Ambystoma tigrinum tigrinum*
Green anole	*Anolis carolinensis*
Ground skink	*Scincella lateralis*
Rough green snake	*Opheodrys aestivus*
Six-lined racerunner	*Cnemidophorus sexlineatus sexlineatus*
Southern copperhead	*Agkistrodon contortix contortix*
Southern fence lizard	*Sceloporus undulatus undulatus*
Southern ringneck snake	*Diadophis punctatus punctatus*
Spotted turtle	*Clemmys guttata*
Spring peeper	*Pseudacris crucifer*
Timber rattlesnake	*Crotalus horridus*
Fish	
American eel	*Anguilla rostrata*
Black crappie	*Pomoxis nigromaculatus*
Bluegill	*Lepomis macrochirus*

Table B-1. Wildlife Species Likely Found Within the Shaw AFB EA ROI
(Page 4 of 4)

Common Name	*Scientific Name*
Bowfin	*Amia calva*
Channel catfish	*Ictalurus punctatus*
Flier	*Centrarchus macropterus*
Gizzard shad	*Dorosoma cepedianum*
Redbreast sunfish	*Lepomis auritus*
Redfin pickerel	*Esox americanus*
Sawcheek darter	*Etheostoma serrifer*
Spotted sucker	*Minytrema melanops*
Striped bass	*Morone saxatilis*

Table B-2. Plant Species Likely Found Within the Shaw AFB EA ROI

Common Name	*Scientific Name*
Trees	
American sycamore	*Platanus occidentalis*
Black gum	*Nyssa sylvatica*
Cypress	*Taxodium sp.*
Elm	*Ulmus sp.*
Hackberry	*Celtis laevigata*
Laurel oak	*Quercus laurifolia*
Loblolly pine	*Pinus taeda*
Red maple	*Acer rubrum*
Southern red oak	*Quercus falcata*
Swamp chestnut oak	*Quercus michauxii*
Swamp white oak	*Quercus bicolor*
Sweetgum	*Liquidambar styraciflua*
Water oak	*Quercus nigra*
Water tupelo	*Nyssa aquatica*
Willow oak	*Quercus phellos*
Shrubs	
Black willow	*Salix nigra*
Chinese privet	*Ligustrum sinense*
Holly	*Ilex sp.*
Viburnum	*Viburnum sp.*
Herbaceous	
Bahiagrass	*Paspalum notatum*
Ferns	*Osmunda sp.*
Nut-sedges	*Cyperus sp.*
Reedgrass	*Phragmites sp.*
Rushes	*Juncus sp.*
Sedges	*Carex sp.*
Trumpet vine	*Campsis radicans*
Wild grape	*Vitis aestivalis*

Source: Personal communication, Holmes 2003.

Table B-3. Noxious Weeds in South Carolina

Common Name	*Scientific Name*
Alligatorweed	*Alternanthera philoxeroides*
Brazilian elodea	*Egeria densa*
Common reed	*Phragmites communis*
Eurasian watermilfoil	*Myriophyllum spicatum*
Giant salvinia	*Salvinia molesta*
Hydrilla	*Hydrilla verticillata*
Hygrophila	*Hygrophila triflora*
Limnophila	*Limnophila sp.*
Purple loosestrife	*Lythrum salicaria*
Slender niad	*Najas minor*
Water chestnut	*Trapa natans*
Water hyacinth	*Eichhornia crassipes*
Water lettuce	*Pistia stratiotes*
Water primrose	*Ludwigia uruguayensis*

Source: South Carolina Department of Agriculture n.d.